THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXIII. No. 1861.] LONDON, JANUARY 10, 1899. [51ST YEAR. PRICE 6d.

WELDON MUD
FOR
GAS PURIFICATION,
For use in the
RECOVERY OF SULPHUR,
ALSO
Removal of last Traces of SULPHURETTED HYDROGEN in catch position.

Full Particulars on application to the Patentees:
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— LIMITED, —
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GAS ENGINEERS' AGENTS AND CONTRACTORS FOR
Meters, Fire-Clay Goods, Oxide of Iron, and all other Gas Apparatus. Retort Carbon purchased.
Inquiries Solicited.
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AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

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GAS-LEAK INDICATOR.
For Particulars and Price apply to
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ESTABLISHED 1830.

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FOR TOWN WATER-WORKS AND OTHER SUPPLIES.
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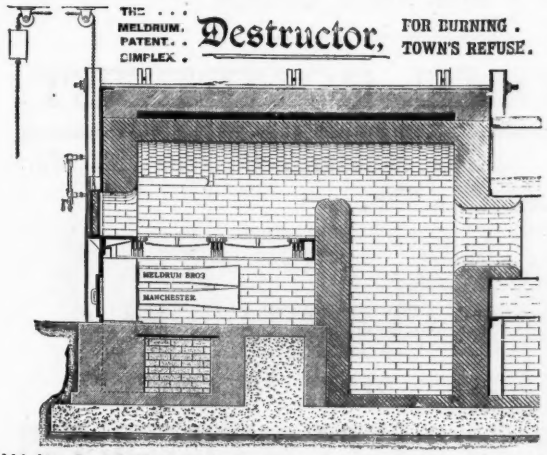
HYDRAULIC ENGINEERS, 100, BUNHILL ROW, LONDON, E.C.

THE Utilization of Towns' Refuse for some practical purpose has been successfully solved; and there is, therefore, no reason why every township should not have its own Electric Light Installation, and obtain all the power from its Dust-Bins.



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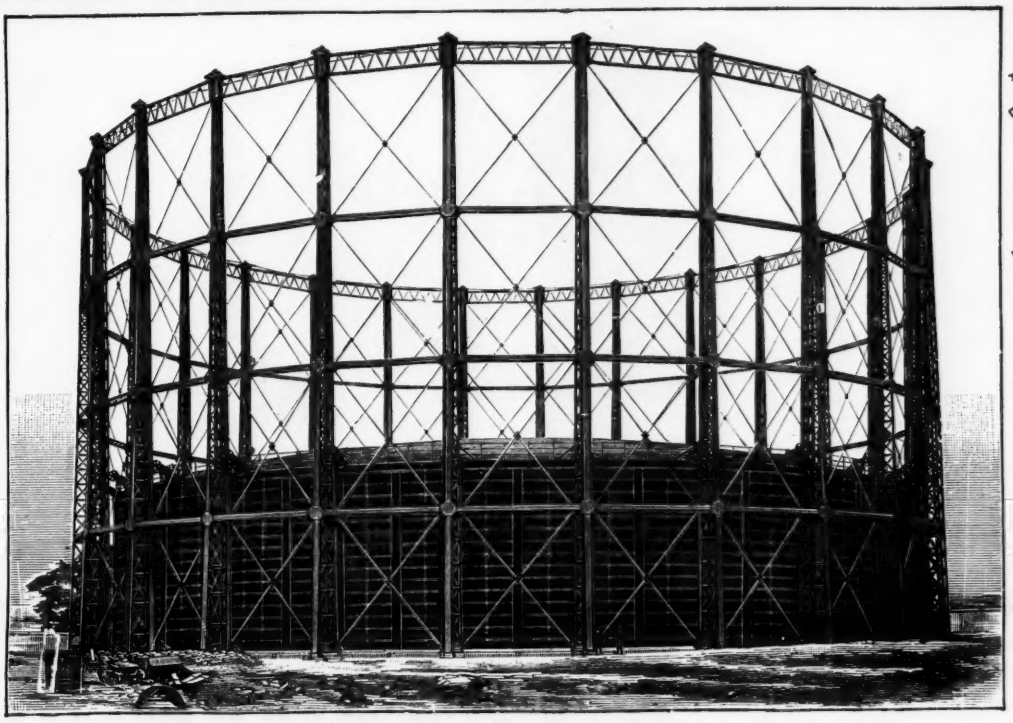

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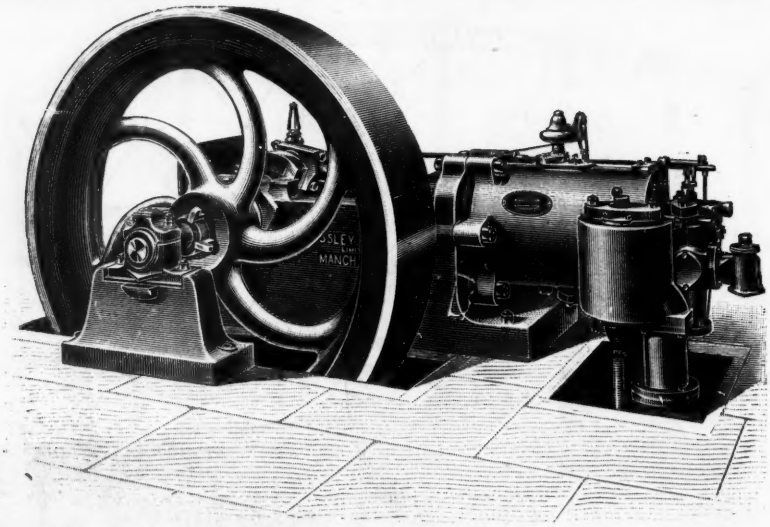

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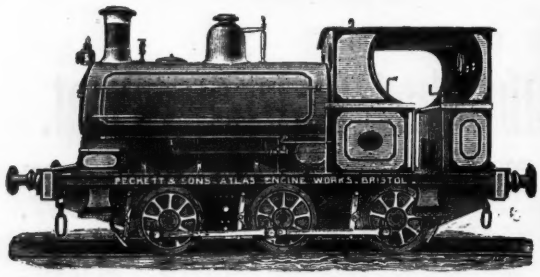

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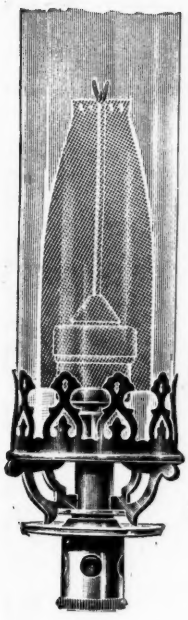

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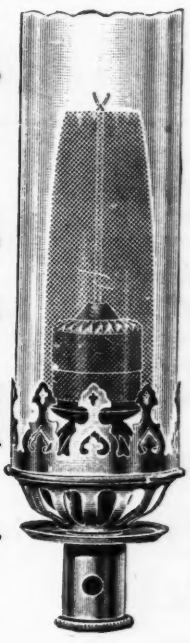

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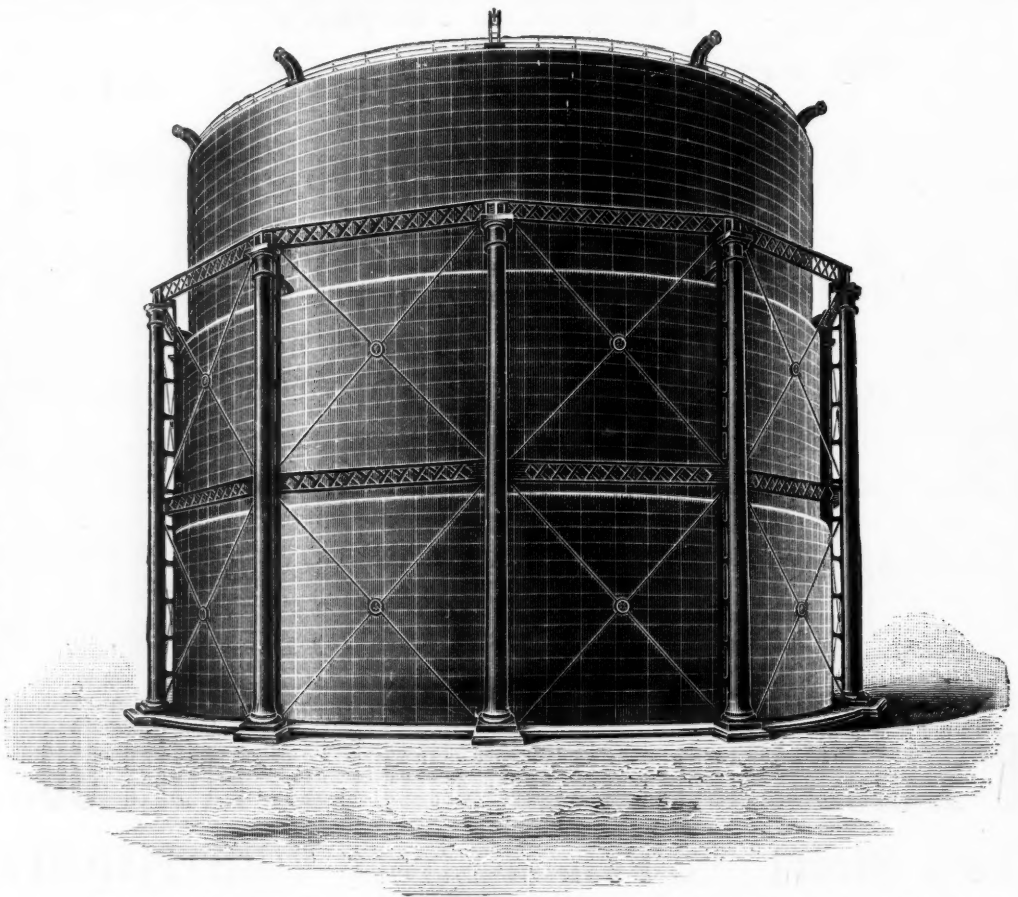

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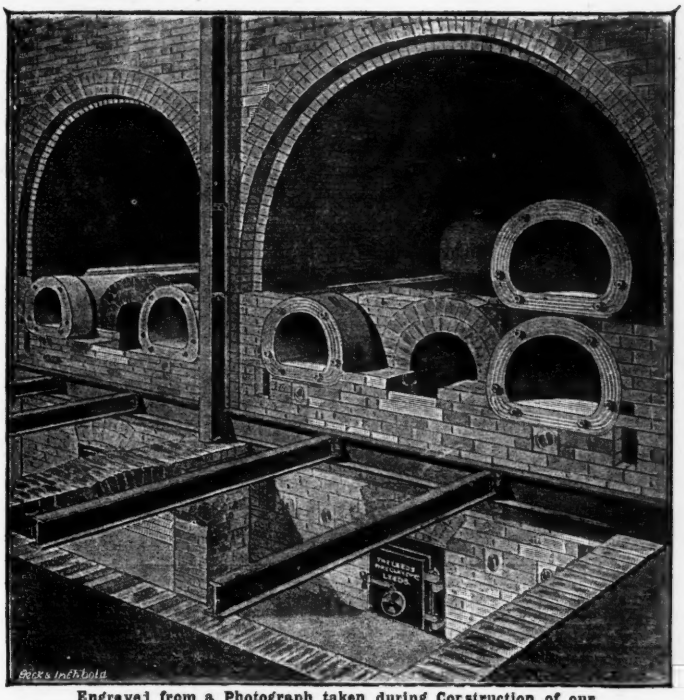

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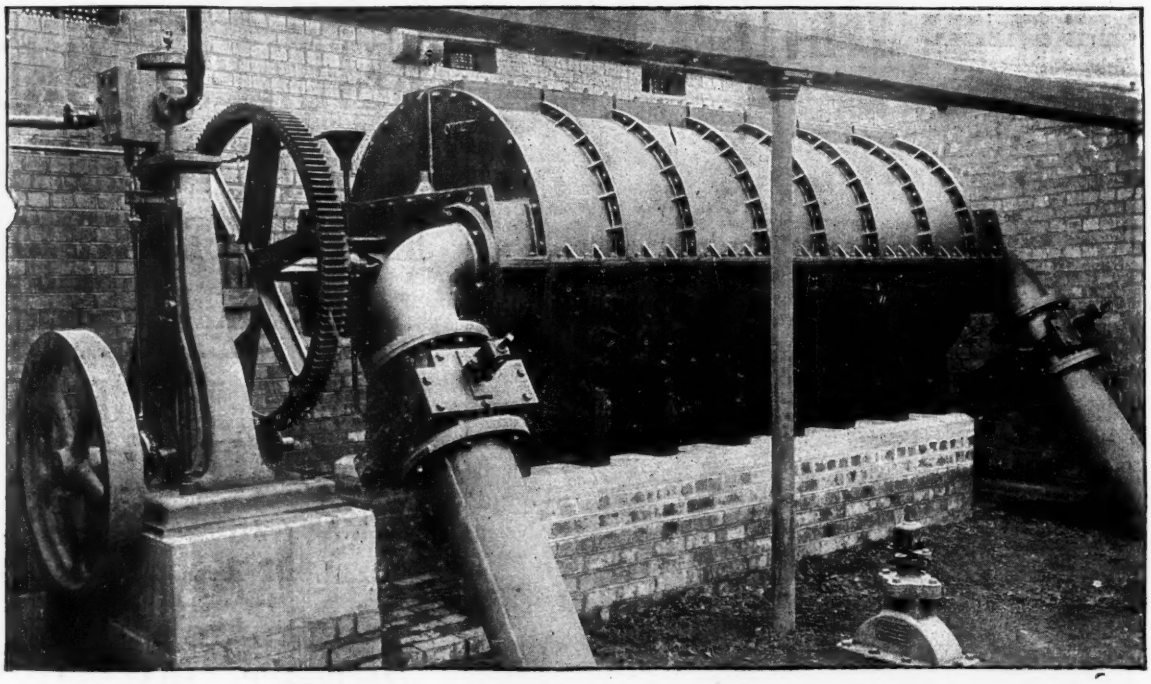

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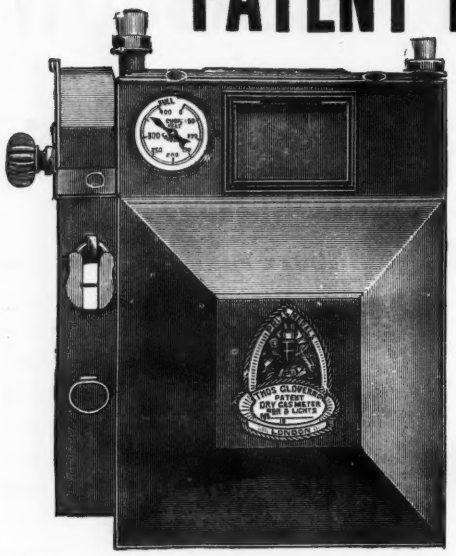

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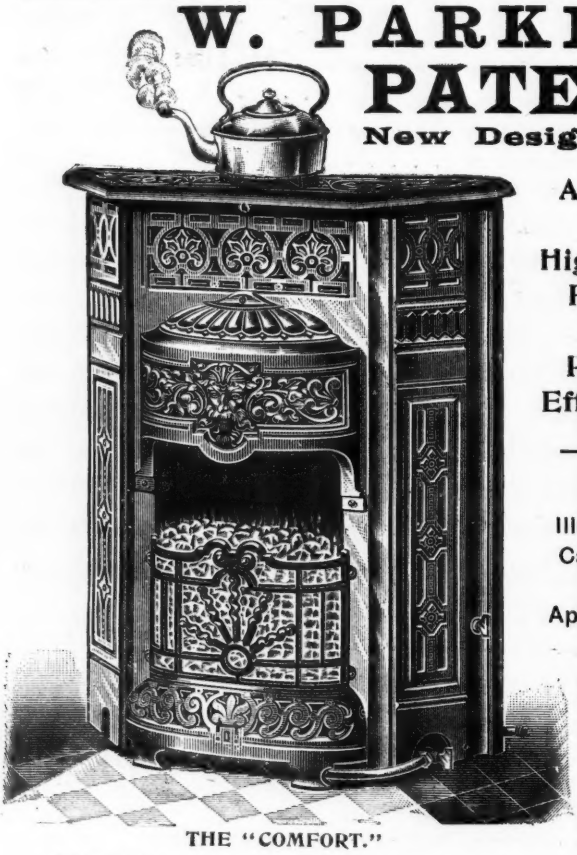

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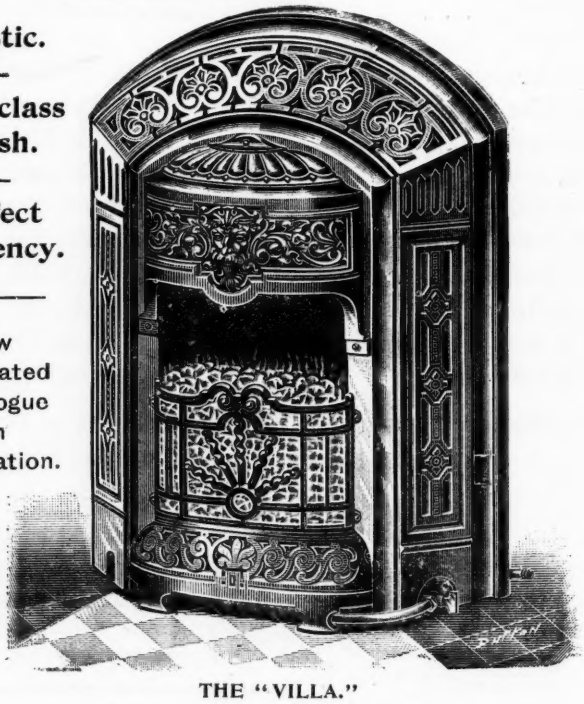

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EDITORIAL NOTES.

Gas Suffocation Cases in Belfast and London.

A VERY sad and singular fatality is reported from Belfast. A young domestic servant, and a child, were found suffocated by the town's gas, which had been escaping into the bedroom all night from a fully-opened, unlit bracket burner. Two other occupants of the house were rendered unconscious from the same cause, but recovered under treatment. The head of the household happened to be spending the night out; and it was only on the wife's return home about ten o'clock the next morning that the mischief was found out. The newspaper report states that the woman, going into the house from the open air, found the atmosphere so full of the "fumes" of gas, that she was almost "driven "back." As already stated, the servant girl and a child she had with her were past human aid; but another child, a mere infant, still breathed. It is surmised that the girl, "being new to city life and gas-pipes, had blown the gas "out when retiring to rest the night before." It seems very remarkable that the naturalization of the American product, carburetted water gas, in the United Kingdom should also be attended by the unconscious repetition of a performance upon the gas-burner which has hitherto been heard of only in the United States. "Blew out the gas "before going to bed" has a familiar sound as the finding of an American Coroner's Jury; but it is to be hoped that the practice is not coming over here with the new American illuminating gas. The Belfast fatality proves once more that the odour of lighting gas is not sufficiently strong to arouse a sleeping person; while the fact of two sufferers recovering from the effects of inhaling it all night long goes to reassure those who have feared that a mixture of carburetted water gas and coal gas, such as is supplied in Belfast, possesses a peculiarly poisonous quality.

Another most deplorable affair of the same order was investigated on Saturday at Charlton, near Woolwich. On Thursday evening, a policeman, John Pay—who deserves to be honourably mentioned for the conspicuous common sense and devotion to duty which he displayed on this occasion—forced an entry into a house occupied by a Mr. Willis, his wife, and son. These three persons were found lying in bed insensible, under the action of South Metropolitan gas, which was escaping from an unsealed water-slide pendant in a downstairs room. There was no mystery about the affair; and the constable did exactly the right thing in the circumstances. He found the meter, shut off the gas, threw wide open the doors and windows, and sent for a doctor. The woman was dead. Policeman and doctor set to work to revive the father and son, who were "practically dead," and after a long struggle of several hours succeeded in restoring animation to the younger victim; but on Saturday the father was only just alive. Evidence establishing the cause of the fatality was given by a foreman fitter of the Gas Company; and there the case ended. It was not the first, nor will it be the last, water-slide pendant accident; but in view of the enormous number of these fittings in use, the marvel rather is that trouble with them is so rare. This is probably due to the circumstance that the "slide" is not often used as such, while everything that happens to the pendant in use—such as the lack of a glass globe—tends to close instead of opening the hydraulic joint. It is only fair to note that there would not be any carburetted water gas in the South Metropolitan supply to the Woolwich district. It has never been denied, however, that common coal gas will prove fatal if it is breathed in sufficient quantity for a lengthened period. In this case the house seems to have been shut up for a whole night and day, until a neighbour, noticing the unusual appearance of the place, drew the attention of the police to the circumstance.

The Common Sense of Lamp Accidents.

WITHOUT loss of time, the "Daily News" has repudiated the interpretation we ventured to put last week upon its publication of a number of cases of lamp accidents under a heading which imputed blame to the lamp and not to the oil. Alluding to our comment as that of a "trade "journal," the "Daily News" hastened to declare itself on the side of the London County Council, the "Star," and the majority of the Petroleum Committee, as regards the necessity of raising the flash-point of lamp oil to 100° Fahr. If the reference to the "JOURNAL" as being a "trade" organ was meant to imply that we are commercially interested in

the mineral oil trade in general, and the American oil trade in particular, the imputation is baseless. If the "JOURNAL" had any "trade" interest in the subject, it would obviously find expression in the advocacy of gas lighting as being better and safer than any kind of oil or lamp lighting. As a matter of fact, this is our position, which we have never concealed or abandoned in any comments upon the general subject of lights and lighting. At the same time, it is the plain duty of every section of the Press to further the cause of right and fair dealing, wherever this advocacy appears to be needed in regard to a question in which the particular journal is legitimately interested. The mineral oil trade of the United Kingdom touches the gas industry at more than one point; and we have no desire to see it placed under unnecessary disabilities, especially in the narrow, selfish interest of a small section of traders. For all this outcry against the "deadly low-flash" oil is vamped up by the Scotch oil interest in the first place, and is supported by those dealers who want to make the public pay a higher price for lamp oil than there is any necessity for. If the "Daily News" will take the trouble to inquire into the proceedings of the Petroleum Committee, it will soon find ample justification for the Chairman's protest against the barefaced way in which the Committee were captured by trade interest. It was only by the Chairman's forbearance that the Committee were able to present a report at all; and it is altogether idle to pretend that the particular recommendation for raising the flash-point has any force in the circumstances.

We are ready to give all the credit that is due to the London County Council for their desire to prevent lamp accidents; but we hold that the right way to attain this laudable object is to deal with the lamps, and not to tamper with the oil trade itself. It is ridiculous to ascribe any weight to the "opinion" of a London halfpenny evening newspaper on this technical matter. Here are the plain facts: By using a suitable lamp in a proper manner, oil of any flash-point can be safely burnt. Look at the coster's naphtha lamp, the perfectly safe sponge benzoline lamp, and so on to the "Lucigen" and Wells lamps. The flash-point has absolutely nothing to do with the case of safe lamp lighting; but it has everything to do with the trade of the oilman. There is never a retailer of oil who, by advertisement or otherwise, adjures the public not to buy the "deadly low-flash" lamp oil, but asks a higher price for his so-called "safe" oil. That is what raising the flash-point means. It is beside the mark to say that there is in the wholesale market cheap oil of a high flash-point. True; but the retail purchaser does not get it. If he asks the oilman for a high-flash oil, the wily shopkeeper promptly responds by charging another fourpence a gallon, or so; and even then the buyer has only the counterman's word that he does not take all the stuff out of the same barrel. Let us look these facts in the face, if we wish to understand the question of the petroleum trade in all its bearings. If this is done, there need be no fear as to the superior staying power of common sense over faddism and selfish interest becoming manifest, even in the "Daily News."

The Grievance of Bricklaying.

IT would not be a matter of great surprise if the next industrial war were to originate over the question of bricklaying. The mutterings of discontent on the part of the employers in this trade—it would be a misnomer to style them masters—have been heard for some time past; and but for the brisk state of their business of late in London and the great towns, the climax would probably have been reached before now. Possibly the fact of the bricklaying fraternity having found a sort of Earthly Paradise in the Works Department of the London County Council may have tended to delay the day of reckoning; but it is certain to come sooner or later. The employers everywhere—more especially in London—are keeping very quiet, and putting up with almost everything in order to avoid a standstill. We quite expect the final touch, that will precipitate the floating questions of work and wages, to come from the men's side. Not long ago the spectacle was presented in South London of a couple of score of Society bricklayers knocking off because one man worked too fast for them; and although the affair was hushed up in consequence of the outburst of public ridicule on these "wait-a-bits," at some time or other the Trade Union policy of shirking to the limit will overreach itself, and then "the fat will be in the fire." It is an incontestable fact that the labour cost of a rod of brickwork to-day is about double what it was even twenty years ago, notwithstanding the march of improvement in brick-making and the application of machinery to the saving of labour in building. The sole and ample cause of this increased cost is the "conspiracy of idleness" fostered by the Trade Unions. Bricklayers are now paid higher wages, and do less work. Their work is not better, as a rule, because the standard of tradesmanship is changed. The custom of apprenticeship has died out of the trade; and now a full-price bricklayer is not necessarily an expert hand, but only a man who has a clean Society card. A month previously he may have been a gipsy, a sailor, or a waiter. All he has to do is to "roll in" with a Society official and pay his footing. He is then rated a bricklayer; and if he is slow at his job, the pace of all the rest of the gang will be moderated to suit him. This is no burlesque statement. The representative Bricklayer on the London County Council, Mr. H. R. Taylor, is recorded to have boasted that bricklayers do not lay so many bricks as they did, and that they never will again. Of course, the excuse is offered that modern bricklaying is so complicated and artistic a business, as compared with the old craft, that men cannot do so much of it in the day! Also, Mr. Taylor, when he worked at the trade, never flushed or grouted his work—the wicked "master" would not permit it. Now, the virtuous Society man will not lend himself to the defrauding of the public, and could not scamp his job "was it ever so!" Consequently, a gratified public must rest content to pay twice the price of bricklaying that was formerly charged.

Unfortunately, this contention is too thin. The Bricklayers' Society have adopted the unwritten rule that "the "duffers must live as well as the others;" and they are running it to death. By the very nature of their trade, their output cannot be checked by reference to the possibility of foreign competition, as with engineering. It is the first impulse of the hand labourer, at all times and everywhere, to take the narrowest view of his trade interest. Hence he always objects to labour-saving machinery when it touches his own work—setting his face against its introduction, and, when this cannot be prevented by fair means or foul, checking its output to the uttermost. There is no bricklaying machine; but there are machine-moulded bricks, brick-hoists, and mortar-mills. The bricklayer takes good care that the employer, and through him the public, shall not benefit by any of these things. A modern observer writes: "One thing "which strikes the most ignorant traveller in America is "the intelligent attitude of the American workman to-"wards automatic machinery. So far from being afraid "of it, he welcomes it. The English workman, on the "other hand, appears to discourage and suppress it. It "would seem to me that the American workman is fight-"ing with, while the English workman is fighting against, "a very clear law of Nature, and that sooner or later the "trade of the world will be to him who uses every help "that Nature gives him." It is very certain that there is no room in the world for the "Union stroke," which only makes work dear without bringing compensating advantages. A workman who only does half as much in a day as he can and ought to do, is a fraudulent individual, although his object may be that of making life easy for the "duffer" at his side. It is an altogether unlovely aspect of Trade Unionism that it is only benevolent at the employers' expense.

Sulphur in Manchester Gas.

A SAYING which has lost repute in these days of University Extension teaching, declares that "a little knowledge is a "dangerous thing." The late Sir W. Siemens held quite the contrary opinion; believing that ever so little knowledge is better than utter ignorance. The difficulty is that this language is wholly relative. The most knowing among us does not know everything; nor is the ignorant man necessarily a fool. Moreover, occasions continually arise when those who flatter themselves that they really "know "a thing or two" are brought up "all standing" before something in their own line which upsets their ideas. An illustration of the latter class of incidents is furnished by part of the proceedings of the Manchester City Council at last Wednesday's meeting. Councillor Grimshaw asked the Chairman of the Gas Committee whether any steps were being taken to deal with the sulphur in the town's

gas. Manchester gas has always been notorious for the neglect of sulphur purification; but recently matters seem to have gone from bad to worse in this respect. In reply, Alderman Gibson, with what looks at first sight like a fine irrelevance, started talking about the success of the regenerator furnaces at the Rochdale Road and Bradford Road stations. He said that the regenerator settings had resulted in a yield of 500 cubic feet of gas per ton above the old system of carbonizing. Valuing this gain at the selling price of the gas in the district, instead of its cost into the holder, the worthy Chairman made out that the benefit had been £8144 and £8945 for the respective stations. He then went on to remark that, although the regenerator settings had been so profitable, the system had the drawback of very considerably increasing the amount of sulphur in the gas! This is a very dreadful result to follow from the use of regenerator settings of retorts, to which those engineers who favour the principle would do well to look without delay. Alderman Gibson proceeded to admit that the only cure for the evil in question was lime purification, to which the Committee would have to come. This is quite true. How sulphur purification is to be introduced into the crowded old stations of the Manchester Corporation, is a difficult problem to solve; but it will have to be done, if the necessary boxes are put upstairs. The use of the air process—or oxygen, if the Committee prefer it—renders sulphur purification much easier than was formerly the case; and it is scandalous that Manchester should have gone on to the present day sending out gas with from 40 to 60 grains of sulphur in 100 cubic feet, while many a little Company in the South is required to keep the impurity down to 15 grains or even less. However, it is never too late to mend; and that additional 500 cubic feet of gas per ton of coal will pay for all the lime purifiers Manchester needs.

British Trade in 1898.

THE state of British trade during the past year formed the subject of a number of special reports collected and published by "The Times" on Friday last. Taking one with another, the results recorded are satisfactory. Prices have ruled fairly high. The interruption of work in the engineering trade caused by the strike of the previous year was not wholly made up. Orders could not be filled with the proper despatch; but the electrical industries suffered from this more than the gas industry. The Workmen's Compensation Act is credited with having made coal and iron dearer. South Wales, of course, suffered most heavily by the insensate colliers' strike; and it seems strange that the tinplate industry should remain depressed, although tin itself has risen greatly in value. There has hardly ever been so busy a year for the leading industries of the West of Scotland; and just the same tale is told of the East Coast of England. Indeed, the metal trades everywhere did remarkably well last year, and start the new year with good prospects. The coal trade of Newcastle-on-Tyne and Sunderland was "booming" all the year. Gas coals rose from 8s. 6d. to 11s. per ton, and closed at 9s. The men kept steadily at work, making the best of the good times thrust upon the North of England by the folly of South Wales; and the volume and value of the trade done were alike unprecedented. There was never so much shipbuilding in the world's history, locomotives were not to be had for money, and warlike material was in great demand. The one dark page is that which records the operations of the chemical trade. In the Cleveland district, disappointment ruled; Manchester was almost as unfortunate; and Newcastle was actually despondent. Fertilizers have not done so badly; but it is confessed that the nitrate trade is all to pieces. The old remedy of combination of producers to restrict the output is talked of; but the interests involved are too diverse to render success in this direction probable of speedy attainment. "Sulphate "of ammonia, owing to its supply and demand being now "about balanced, has maintained a level of price about "20 to 25 per cent. over that of nitrate, whereas two years "since it had touched a price 10 per cent. below nitrate." Business in the tar products trade has been disappointing. The old alkali works on the Tyne and elsewhere find it every year more difficult to compete with the new ammonia works on the West Coast and the Continent. "An important "feature of the year's business has been that farmers have "again had a fairly prosperous season." So that there ought to be plenty of money in the country, taking things all round.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 92.)

THE past week, the first of the New Year, was a serious disappointment to the Stock Exchange. Disgusted at the slackness and quietude which was persistently marking the latter part of the old year, everybody had been encouraging himself and the rest with the promise of what was going to happen when the date changed. It was therefore with something approaching dismay that they found last week that markets were stuck as fast as ever, and obstinately refused to move. The tendency, too, pretty well all round, was weak; and most departments from Consols downward were sufferers. Banks, however, have had a good half year; and prices responded to the increased rates of dividend. The Money Market showed the usual revulsion after the hot demand was over; and both short loans and discount are at easy rates. In the Gas Market business was again much below the average, and was quite devoid of striking incidents. Changes of quotation were few in number and slight in degree; but they were all in the upward direction—indicating a general firmness of tone. The most noticeable thing is the quotation of Gaslight and Coke consolidated issues, whereby half an alphabet of stocks become condensed into four, to the great advantage of all concerned. Be it noted that the present quotation of 116-118 for the converted stock is the exact equivalent of 290-295 for the unconverted "Gaslight A" quoted last week. And the equivalent of a 12½ per cent. dividend on "Gaslight A" will be £4 18s. per cent. on the converted stock. A small amount of business was done in four issues at practically unchanged figures for ordinary, maximum, preference, and debenture stocks. South Metropolitan was not very active, but made a nice recovery. The closing mark was 141, which justified a higher quotation than a mere rise of a point. Commercials were quiet and unchanged. In the Suburban and Provincial group, hardly anything was touched but British, for which buyers were giving a shade better price. Transactions were less than moderate in the Continental Companies; but Imperial quietly and steadily held its position, and gained a point too. Among the rest, San Paulo rose fractionally; and one or two debenture issues came out better *ex div.* Business in the Water Companies was very limited. Movements were irregular; but the gains more than counterbalanced the losses.

The daily operations were: Gas was very quiet on the reopening on Tuesday; but prices were firm. Imperial advanced 1; and British and San Paulo, ½ each. Wednesday's business was quite as light; and quotations did not move. On Thursday, Converted Gaslights were quoted for the first time. South Metropolitan rose 1. In Water, West Middlesex rose 3. Friday's transactions were not more active, and nothing moved. On Saturday Gas issues were quiet and unchanged, but firm. In Water, East London rose 2; and Southwark ordinary, 1. But Grand Junction fell 2.

ELECTRIC LIGHTING MEMORANDA.

Electric Lighting and Traction Plant at Cork—Merits of the Combination—Convenience rather than Economy—A Table of Electricity Supply Works.

WITH the beginning of the New Year, come reports of the inauguration of the latest device for cheapening electric lighting—the combination of lighting and tramway traction stations. This expedient appears to be a supersession of the combination of rubbish destruction and electric lighting, which seems to be hanging fire in more senses than one. The first lighting and tramway traction scheme to be actually realized in the United Kingdom is the one at Cork, particulars of which have been published in the leading electrical journals on the authority of the British Thomson-Houston Company, who were the chief contractors. We do not propose to repeat the description of the plant, which, as usual, is a comprehensive collection of a variety of mechanical and electrical specialities; every example being (let us charitably suppose) the best of its kind in the market. The vitals of the plant are three Babcock and Wilcox boilers, rated to evaporate 8000 lbs. of water per hour, and keep steam at 150 lbs. pressure; and three engines. It is not a very big set to start with; but it is large enough for an experiment. A battery of accumulators forms part of the plant. The whole undertaking is a venture of Mr. W. M. Murphy, the moving spirit in the Dublin tramways concern, who wants to show the Dublin Corporation how well a combination of the kind answers. Let us hope he will not be disappointed in the financial result of the Cork business. There cannot be much electric lighting work to be done in Cork, though there is talk of 217 intending consumers being on the books, with the equivalent of 14,447 lamps of 8-candle power, and 113-horse power in motors. There are also 16 two-decker tramcars on the line. We do not know the exact length of the tramway served; but it is stated that 20 miles of cable have been laid for all purposes. The overhead-trolley wires are carried chiefly on poles; every other one also carrying an arc lamp. The whole thing reads very engaging, in print;

and the commercial development of the undertaking will be interesting to watch.

Meanwhile, the electrical journals regard the new combination with approval. Still, from remarks that are made on the idea, we gather that its successful realization is not quite a matter of course everywhere. The problem is "to obtain the combined output with the minimum of plant, and to run that plant with a high load factor for as long a period as possible." Its solution is complicated by numerous considerations, of which the most salient is the fact that for tramway working practically a continuous current at about 500 volts is wanted; whereas existing lighting stations, upon which the grafting of a traction business might be desired, work usually at anything rather than this. Some are alternating, and some continuous; and the voltage may be from 3000 volts down to 110 volts. The consequence is that in many places the only things common to the lighting and traction branches of the business of electricity supply will be the boilers and the station staff. The traction load will not serve to improve the load factor of the lighting plant. In these circumstances, the commercial conditions of the combined undertaking will be more like those of a gas and water company than any other kind of business.

This consideration is well and clearly brought out in an article appearing in the current number of the "Electrical Review." Of course, the comparison of a lighting and traction electrical plant to a gas and water supply undertaking is ours. It is unnecessary to show how natural the latter combination is, up to a point. There may be no limit to the convenience of the union, in the case of electricity generation for different applications. Gas and water are both "fluids;" and the administration and general distributing arrangements are very much the same for both. Electricity for lighting and for tramway working appears to differ almost as much as gas and water. The dynamo that is feeding lamps cannot at the same time be used for driving tramcars, and *vice versâ*. The same dynamos may be made to pay the double debt, but not at the same instant. Also, the use of separate motors is indicated as the only means of preventing the fluctuations of the tramway load from affecting the lighting. So that there is good reason for fearing lest in many localities the hope of materially cheapening the cost of electric lighting by working the service in with tramway traction will be vain. Similarly, it cannot be shown that the cost of electric tramway traction will be noticeably reduced anywhere by making it a branch of an existing lighting undertaking. There may be, and doubtless are, powerful considerations favouring such a combination—far more, indeed, than can be asserted for the older device of putting the electricity generating station into a dusthole; but an important reduction of the cost of the unit is not among them.

With the current number of the "Electrician"—being the first in the year—there is issued a large sheet supplement "Table of Electricity Supply Works of the United Kingdom." This is an annual publication of considerable value for purposes of reference; but it is also of great interest as an indication of the lines of development of the industry of electricity generation and supply. So copious is the information contained in this table, and to such large dimensions has it grown that there is the greatest difficulty in discovering any system in the mass of detail. The engineers responsible for the equipment of British central stations have been communicative to the highest degree. They appear to favour all manner of principles and methods; and it is truly marvellous where they get all their diverse machines and cables from. To explain off-hand the meaning of all the entries, would be a good exercise in technology. Half a dozen lines of the table, chosen at random, would make a stiff "paper" for an examination. Our contemporary points out that the most noticeable feature of the returns is the increase in the number of undertakings that declare a supply at 200 volts and upwards. These now number 87, of which not half keep up the alternative of a supply at 100 or 110 volts. Cork, the latest, is also the highest, with 460 volts between the "outers" of its three-wire system. The alternative is one-half of this, or 230 volts. How will the lamps answer at this pressure? It is the last volt or two that break down the filament. It is also noticed that the number of motor connections is increasing; but this movement is very slow—remarkably so, indeed, considering the fuss that is made about the use of electric motors in the technical press. The truth of the matter is that the electric motor cannot yet compete on all-fours with the gas-engine. Another useful feature of the same journal is a tabular statement of electricity works costs disclosed for 1896 and 1897.

The "Robert Hunter" Fund.—There are three contributions to hand this week towards the fund—namely, £1 1s. from Mr. W. Ford, of Stockton-on-Tees; £2 2s. from T. D.; and £5 5s. from Messrs. Joseph Turner and Co., of Queen's Ferry, Flintshire. This makes the total of the fund at the present time £299 6s.

The Metropolitan Water Inquiry.—The resumption of the proceedings of the Royal Commission on the Metropolitan Water Supply, which was fixed for yesterday, has been postponed till next Monday. Up to the closing of the Private Bill Office on Saturday, we learn that the deposit of the "plans, sections, and books of reference" required in connection with the County Council's Aqueduct Bill had not been deposited; so the promoters are hopelessly in default.

GAS BILLS FOR 1899.

According to custom, we commence our abstract of the Bills relating to gas supply which have been deposited in readiness for the ensuing parliamentary session, beginning with those for the incorporation of new statutory Gas Companies.

The Cobham Gas Bill proposes to incorporate a Company for supplying with gas the parish of Cobham and adjacent places, in the county of Surrey; acquiring by agreement or arbitration the existing undertaking of the Cobham Gaslight and Coke Company, Limited. The capital of the Company is to be £15,000, with power to borrow £5000. The existing works may be maintained or abandoned. Clause 30 runs as follows: "Any fittings (including slot meters) let for hire under the provisions of this section shall not be subject to distress or to the landlord's remedy for rent, or be liable to be taken in execution under any process of any Court or any proceedings in bankruptcy against the persons in whose possession the same may be, provided that such fittings have upon them respectively a distinguishing metal plate affixed to a conspicuous part thereof, or a distinguishing brand or other mark conspicuously impressed or made thereon sufficiently indicating the Company as the actual owners thereof." Following the above, is a clause enacting that "the Company may, on the request of the owner or occupier of any property within the Company's limits of supply, give and continue to give a supply of gas for all or any of the purposes mentioned in the last preceding section of this Act, on such terms and conditions in all respects as may be agreed on." The maximum price of gas is to be 5s. per 1000 cubic feet for 15-candle gas. No penalty for insufficient or defective supply is to be incurred in cases of accident, or unavoidable cause. Meters are to be rented at not exceeding 15 per cent. of the price, payable quarterly in advance. Four per cent. interest is to be allowed on cash deposited as security for the price or rent of a meter. Meters are to be kept in repair by the Company, who are to have access to them for the purpose at all reasonable times. Errors in defective meters are to be deemed to have arisen during the last preceding quarter, unless proved to have first arisen during the current quarter. Persons appointed by the Company for the purpose are to have power of entry upon premises supplied with gas, between the hours of 9 and 4, to inspect the meter and other apparatus, refusal to be visited with a penalty of £5. Unused pipes and fittings are to be removeable after 48 hours. Persons connecting or disconnecting meters are to give 48 hours' notice, subject to a fine of 40s. Fraudulently, wilfully, or negligently injuring or tampering with meters is to be punishable with a penalty of £5, in addition to the remedy for damage done. Power is sought to supply in bulk; and to make application for electric lighting powers.

The Crowborough District Gas Bill is to incorporate a Company for supplying with gas the district named, in Sussex; acquiring for the purpose the undertakings of the Crowborough District Gas Company, Limited, and the Mayfield District Gaslight Company, Limited. The new Company seek to supply gas and electricity. The capital is to be £24,000, with power to borrow £6000. Directors and shareholders are not to be disqualified by being members of District Councils, and *vice versâ*. Power is sought to supply fittings, which are to be exempt from distress. The maximum price of 15-candle gas is to be 5s. per 1000 cubic feet. The general provisions of the Bill are a duplicate of those of the preceding measure.

The Fishguard Water and Gas Bill is to incorporate a Company for supplying gas in the parishes of Fishguard, Manorowen, and Llanwnda, Pembrokeshire. The capital (undivided) is to be £16,000, with borrowing powers to the amount of £4000. Besides supplying gas, the Company also propose to deal in and sell lime. The maximum price of 15-candle gas is to be 6s. per 1000 cubic feet. The Bill also generally conforms to the preceding measures.

The Ilford Gas Bill proposes to incorporate a limited Company originally founded in 1839. The Company have obtained Provisional Orders dated 1873, 1881, and 1894. The original capital is £5000 in 10 per cent. shares, £32,890 in 7 per cent. shares, and a loan of £13,475. The capital of the Company is to be £300,000, whereof £75,780 is to be called the original capital. The first part of this is to be "A" stock bearing a 5 per cent., and "B" stock bearing a 3½ per cent. dividend. The additional capital is to be 5 per cent. stock. All stocks are to rank equally for dividend up to 3½ per cent. Loan capital is asked for in the proportion of one-third. The initial price of gas is not to be altered. Part of the bed of a stream called the Aldersbrook is to be filled in and appropriated, and a river wall is to be constructed on one side of another part of the stream. Discounts up to 20 per cent. are to be sanctioned. The period of error in defective meters is to be limited to the current quarter. The mutual disqualification of shareholders and members of Local Authorities is to be removed.

The Mid-Kent Gas Bill is to incorporate a Company for the supply of gas in a district indicated by the title, with a capital of £140,000, and power to borrow £35,000. The initial price is put at 4s. per 1000 cubic feet; and the illuminating power, at 15 candles. The period of error in defective meters is limited to the current quarter. Power is sought to apply for and carry out an Electric Lighting Order. The right of inspection of new fittings is asked for, with liberty of appeal to two Justices sitting

in Petty Sessions. Notice of these provisions is to be advertised. The proposed site of the works is on the bank of the River Medway, in the parish of Snodland.

The Redditch Gas Bill is to incorporate a Company formed in 1872, who obtained Provisional Orders in 1873 and 1882. The original 10 per cent. capital amounts to £20,000, with £10,000 in 5 per cent. preference shares, and a loan of £5000. The limits of the Act are defined. The capital of the Company is to be £45,000 in ordinary stock, and £15,000 of 5 per cent. preference stock, with the usual borrowing powers. Directors are not to be disqualified by being interested in a contract with the Company. Pipes may be laid in undedicated streets. The sliding-scale is asked for, with 4s. 6d. per 1000 cubic feet as the standard price within a mile radius, and 5s. per 1000 cubic feet beyond this distance from the works. Fourteen-candle gas is proposed. The period of error in defective meters is to be restricted to the last preceding quarter of the year. "In the event of more lights being attached to any meter than the number which it is constructed to supply, the Company may discontinue the supply of gas to any consumer so using the meter, and may for the purpose of ascertaining the number of lights attached to a meter enter upon any premises to which gas is supplied at any time between the hours of 8 a.m. and 6 p.m." The Provisional Orders are to be repealed.

The Rushden and Higham Ferrers District Gas Bill is to incorporate a Company formed in 1892 to acquire the undertakings of the Rushden and the Higham Ferrers Gas Companies, which has been effected. The original share capital of the limited Company was £10,000, which was increased by resolution in 1896 to £20,000. There is also a debt of £2000. The limits of supply are to be extended and defined, excluding the district supplied by the Irthlingborough Gas Company, Limited. The capital is put at £45,000, with the usual borrowing powers. The sliding-scale is asked for, with 4s. per 1000 cubic feet as the initial price for 15-candle gas, subject to discounts. Prepayment for gas may be demanded in certain cases. The period of error in defective meters is limited to the last preceding quarter. The Local Authorities are to have the right of purchase within the next three years.

The Shirebrook and District Gas Bill is to incorporate a Company for supplying an area comprising Warsop and Pleasley, at present forming part of the district of the Mansfield Corporation, but not supplied by this Authority, who have agreed to relinquish their statutory rights over it. The capital of the Company is to be £50,000, with borrowing powers to the extent of one-third. The sliding-scale is asked for, with 5s. as the initial price for 15-candle gas. Three per cent. interest is to be payable on consumers' deposits. The period of error in defective meters is limited to the last preceding quarter. Demands under £50 may be recovered through the County Court. An agreement with the Mansfield Corporation is to be confirmed.

The St. David's Water and Gas Bill is to incorporate a Company for the purpose (among others) of supplying gas to the city of St. David's, Pembrokeshire. The capital of the Company is to be £16,000, with the usual borrowing powers. Fifteen-candle gas is to be supplied, at the maximum price of 6s. per 1000 cubic feet. The general provisions are the same as in the Fishguard Bill.

THE CONTAMINATION OF GAS IN HOLDERS.

It may be remembered that, in the course of his report to the President of the Société Technique du Gaz en France, on the proceedings at the conference of Italian gas managers held in Turin last June, and noticed in recent issues of the "Journal," M. Godinet remarked upon the fact that gas which had entered a holder perfectly clean had been found to show signs of impurity at the outlet. He informed the President that one of the members of the Society was investigating this matter, and that the results would probably soon be made known. The announcement brought from several colleagues of the member in question (M. Ymonet, of Rennes) numerous inquiries on the subject, accompanied by requests that he should deal with it in the technical publications connected with the gas industry. He consented to do so; and his observations were given in the "Journal de l'Eclairage au Gaz" for the 20th ult. It appears that M. Ymonet introduced the subject in the course of conversation at an informal meeting of gas managers of the West of France; and it was then suggested that he should bring it in a more definite form before the larger body at the next meeting. Of course, the proposed paper has not yet been prepared; but, in the meantime, M. Ymonet makes a few general observations upon the question.

At the outset, he states that the contamination of gas in the holder is not due to the contact of the gas with the more or less dirty water in the tank. This being so, he considers it useless to endeavour to isolate the surface of the water by a layer of oil or pure water, as some managers have attempted to do, but hitherto without results. The initial cause of the contamination, he says, is bad washing or insufficient condensation. Contamination is caused in two different ways. First of all, it may result from the liberation of sulphurous compounds in solution in the tank water as the consequence of a considerable fall of temperature during the night. In fact, this lowering of temperature has the effect of altering the density of the upper layer of water to such an extent as to make it heavier than the water beneath. The upper layers are replaced by the lower ones; and the result is movement, mixture, and a kind of effervescence, which liberates the sulphuretted hydrogen in suspension. The remedy is easy of application. All that is needed is to neutralize the water by the addition of a solution of sulphate of iron, introduced into the tank by means of an inverted syphon (say a 2¼ inch iron pipe), so that the solution is well spread upon the surface of the water. In order to prevent the crystallization of the iron salts in the lower part of the syphon, the solution should not be of more than 8° to 10° Baumé (1·056 to 1·070 specific gravity). By using 7 or 8 grains of sulphate per gallon of water in the tank, the most contaminated water will be neutralized.

The second cause of the contamination of gas in the holder lies in the crown; the trouble in this case arising through the action of the very high temperatures during summer. It is brought about by the liberation of the sulphurous compounds absorbed by the latent humidity of the inner surface of the crown—these compounds remaining to a certain extent in a fixed state until dissolved by a sufficiently high temperature. M. Ymonet says that last summer he found the temperature more than 60° C. under the crowns of his holders. When contamination is caused in this way, the only remedy is to clean the crown. This may be easily done by means of a small injector, similar to those used for burning tar; using in place of the latter a solution of sulphate of iron. Of course, it will be necessary to open the manhole in the crown; but the operation can be performed in a few hours. As a subsequent precaution, care should be taken to gradually draw off, by means of a lead syphon, the water at the bottom of the tank—in fact, this remark is also applicable in the case of contamination caused in the first-named way—otherwise, the trouble will return with greater severity. By the introduction of the sulphate of iron, the whole of the sulphides in the bulk of water in the tank are precipitated, and as a consequence the lower portion becomes more highly charged than before. If, under these conditions, there should be a rather sudden fall of temperature, causing the top water to stand at about zero while that at the bottom remained practically constant, movements would be set up which would cause the liberation of the sulphides. Hence the necessity for clearing the bottom of the tank, not merely after the operation, but generally, and by preference when the temperature of the water is several degrees lower than that of the atmosphere.

At the commencement of his remarks, M. Ymonet stated that the primary cause of the contamination of gas in the holder is inefficient washing. Returning to this subject, he makes a comparison between this operation and the one familiar in the household; and he points out that it is not customary for laundresses to rinse the linen in the water used for washing it. Why then, he asks, should one do differently with gas. He therefore advises the use of pure water in the second washer, and its utilization, when it has done its work there, for the first washing, to the entire exclusion of the water coming from the hydraulic main, condensers, and other anterior portions of the plant, which he considers unfit for washing gas. No harm arises from bringing gas in contact with condensation water collected from a point beyond the washer; but trouble will always come from the use of water collected before that vessel.

M. Ymonet concludes his remarks by recording a circumstance which came under his notice only a few weeks since, in connection with works supplying a town containing upwards of 40,000 inhabitants. The gas entered the holders perfectly clean; but at the outlet it completely blackened acetate of lead paper. When this obviously impure gas had passed through an ordinary meter, it had no effect upon the test-paper. It would therefore appear that the gas contained certain sulphur compounds which had eluded the chemical action of the purifiers, but had been dissolved on coming into contact with pure water.

HYDRAULIC ENGINEERING CALCULATIONS RELATING TO PIPE-LINES AND GASHOLDERS.*

Whether by accident or design, Professor Fidler has placed in most suggestive order the different classes of workers in engineering whom he seeks to instruct in hydraulic calculations. "Students, draughtsmen, engineers"—so the order runs; and it is strictly in accordance with the natural progress of engineering training. During the years of his pupilage, while his hands and eyes are being familiarized with the properties and common forms of the materials used in engineering and mechanical construction, is the time for the student to provide himself with his mathematical equipment. There is no royal road to engineering expertness; and the man, whatever his natural aptitude, who has not grown up in daily association with bolts and rivets, with the hammer and chisel, and also with puddled clay or bricks and mortar, will never attain the full mastery thereof. But if

* "Calculations in Hydraulic Engineering: A Practical Text-Book for the Use of Students, Draughtsmen, and Engineers." With numerous illustrations and examples. By T. Claxton Fidler, M.Inst.C.E., Professor of Engineering at University College, Dundee. Part I.—Fluid Pressure, and the calculation of its Effects in Engineering Structures. (Longmans Civil Engineering Series.) London: Longmans; 1898.

he did not at the same time learn how to measure and calculate concerning these materials and the structures of which they formed part, the youth has played the part of the mere mechanic —not that of the engineering student. This is all the difference between him who is going to be a drudge all his days, and him who is to become a master; and there is no other—at any rate, not in the beginning. At no subsequent stage of his professional career will the rising engineer do so much "figuring" as during his pupilage. At times it will seem to him as though all the calculating work of the world he lives in falls to him. He has to work sums for everybody, himself included; and woe be to him if he does not know how to do them, or does them wrong!

Professor Fidler kindly comes to the aid of the student, therefore, first of all; and after him, of the draughtsman. Alas! the poor draughtsman is too often the beast of burden for the whole establishment to which he belongs. He should not need to learn how to make calculations; but he does occasionally want to be guided to the selection of the best formulæ for giving the solution of the particular problem of the moment. Lastly, the full-fledged engineer usually has at his fingers' ends the most useful factors and data for working out his own special calculations. But he does not attempt to carry much of this sort of knowledge in his head, preferring to keep it where he can lay his hand upon it at need. It is of first importance to the engineer to remember that his judgments need to be checked, as regards figures, by the use of proved formulæ. An engineering conclusion may not be arrived at through calculations based upon text-book data; but it should be susceptible of confirmation of this kind, with rare and well-understood exceptions.

Professor Fidler introduces his work with a few pointed observations which are not the least valuable portion of it. He lays all possible stress upon the truth that engineering is more than a science, and more than an application of all the sciences, because it consists in doing things, and doing them in the best way possible under the circumstances. The adaptation of means to ends, of designs to purposes, is the task of the engineer; and there is no science that can point the way in this respect, although the method of execution may be scientific. Hence the first object for the engineer to keep in view is what is to be done; the next consideration is to select among various ways of doing it. "The mental faculty by whose aid the engineer marshalls before him, in their right order, the purposes to be achieved and the conditions to be observed, and by which he goes on to select or devise the right means for the attainment of his end, is a faculty that cannot be cultivated by the usual methods of the educationist, can scarcely be acquired by a university training (though it may perhaps be exercised), and cannot be much strengthened by the reading of books." The sense of this passage is more admirable than the English.

The practice of engineering has of late years been guided more than ever by regard for theoretical expressions of what have been observed to be natural laws. Men who called themselves "practical" of old had a habit of sneering at "theory," and did things in their own way. The theoretical side of engineering continued to grow, however, alongside of the practice, until the two came into contact at various points, to their mutual advantage. Nowadays the most severely practical of engineers is at least careful to respect the natural laws he knows. If he does not bind himself to current theories in all regards, it is mainly because he cannot credit the theories with being the expression of the last words of Nature on their subjects. He has reason for believing that practice goes before theory in many departments of human activity. He sees that it is not the college professors who have developed and improved hydraulic, or electric, or gas engineering; but the working people who have made these matters their business. Consequently, when there is something to be done, the mere practical man "puts his back into it," and does it. Meanwhile, and afterwards, he is quite willing to submit to theoretical criticism of his methods. It may help him to do better next time, and especially to avoid falling into errors that could not have been anticipated by him whose thoughts were concentrated upon the end. The engineer, let us say, is the traveller whose object is to get to his journey's end somehow; the man of science is the roadmaker.

Civil engineering cannot get very far without encountering some question of hydraulics. There is no solution of problems of this kind, save by careful and exact calculation. As Professor Fidler remarks, directly we touch hydraulic engineering we have to be constantly calculating the answers to questions upon which must depend the broad outlines, the minute details, and almost every feature of the work. It is impossible to play with water. Those so-called engineers who essay to deal with water without the most complete and adequate knowledge of what they are about, run the risk of ruin and death for themselves and those who repose trust in them. And there is no forgiveness of error in hydraulics. Blundering and bad work is always punished to the uttermost. The broken dam, the burst pipe, the rent tank tell their own tale.

Yet it is by no means easy to direct the student to a trustworthy and satisfactory compendium of information respecting the engineering aspect of water. Writings upon the subject are among the oldest of engineering treatises; but notwithstanding the enormous modern progress of the exact sciences, the laws of the behaviour of water in motion are almost as mysterious to us as they were to the ancients. As regards hydrostatics, the case is different. Calculations respecting the pressure of water at rest can be surely based upon principles long since ascertained. This seems conclusive enough; yet, as Professor Fidler observes, engineers are mainly concerned with the calculable *effects* of hydraulic pressure upon various structures and machines; so that although the principles of hydrostatics are in themselves exceedingly simple, yet their application to practical work will be as complex as the varying forms of structures, the nature of materials, and the conditions under which structures have to be executed.

Professor Fidler accordingly divides his instruction in hydraulic calculations into two parts, of which the first constitutes the book now under notice. It is devoted wholly to the discussion, from the standpoint of practice, of the static pressure of water, or fluid pressure in general, and the calculation of its effects in engineering structures. The second part will treat of the flow of water, which introduces a very different class of questions. As regards the primary concept of fluid pressure, this is a matter susceptible of clear, almost self-evident expression. Consequently the elementary principles of the subject are stated by Professor Fidler in a very few pages setting forth the familiar considerations that ensue upon the fact of a cubic foot of water weighing just 62·425 lbs. at the temperature of greatest density. The second chapter treats of the action of fluid pressure of uniform intensity, with regard to common forms of engineering structures and machines. The third chapter introduces the important subject of tangential stress, or "hoop tension," which is the first consideration that determines the strength of steam-boiler shells, of hydraulic cylinders, and of pipes under pressure. Next we arrive at the question of the displacing forces acting upon pipe-bends, which leads to the discussion of the strength of pipes and pipe-joints generally. This is sufficient to show the closely practical bearing of Professor Fidler's work.

Pipes, for water or gas, have largely engaged Professor Fidler's attention—so much so, that he has devoted a chapter to the statement and consideration of the few cases of such main pipes being adapted to the construction of tubular arches, in which the pipes themselves constitute the hollow arched ribs. In the practice of gas engineering, the most notable example of this expedient was the canal bridge in Camden Town, where the box-girder was the gas-pipe. The occurrence of an explosion shortly after the completion of this work brought discredit on the plan, which was not strictly merited. In general, however, it may be said with truth that the best engineering opinion is averse to the idea of making gas or water pipes play a double part. In considering the application of his theorems to lines of socket pipe, it is to be regretted that Professor Fidler did not base his remarks upon cited examples. What, for instance, is wrong with the pipe-line of the Southwark and Vauxhall Water Company from Hampton to Forest Hill, which has ruined the Hampton Court Road? Professor Fidler has an Appendix detailing certain experiments on the tensile strength of socket joints, which creates the suspicion that he has looked into this question with some particularity. What he has to say concerning it is good so far as it goes; but he gives one the impression that he could say more if he would, which is tantalizing. In the case of a pumping-main for water or oil, some of the strain tends to draw the joints, if these are sockets, or to break the bolts, if they are flange joints. In certain instances this stress may amount to "some hundreds of tons," as Professor Fidler says. Hence the joints may have a great deal more to do than merely ensuring tightness as regards the contents of the pipe. This is a serious matter; and engineers who may have to deal with a problem of the kind should procure Professor Fidler's book in order to see what he can tell them about it.

Next in practical importance to gas engineers is Professor Fidler's discussion of the "stability of a floating gasholder or an inflated bridge caisson." This is a very brief article; because the conclusion is soon arrived at that "it is conceivable that a gasholder let down to a very low level might float safely without the protection of any roller-guides; but during the process of 'blowing up,' the stability would decrease, and as soon as the centre of gravity is raised above the middle of the thin belt of displaced water, the gasholder will topple over if the guides are not there to keep it up." Nevertheless, the whole chapter is worth reading; although for gas and water works engineers the chief value of the book lies in its original contributions to the available store of information—only too limited—respecting the behaviour of pipes under stress of the contained fluid. On this account, the book is indispensable to an engineering library.

Patents in the Past Year.—In the course of a communication on the above subject which Messrs. Stanley, Popplewell, and Co. have sent to the papers, they say that the total number of applications for patents in 1898 was approximately 27,639; being a falling off from the numbers in 1897 and 1896, which were 30,958 and 30,193 respectively. They state that English inventors are giving more attention than formerly to foreign patents, which often prove more profitable than those of our own country. On the other hand, the number of foreigners taking out English patents appears to be on the increase. Notwithstanding the decrease in the number of English applications, the world of invention appears to be as active as ever. Inventions are of a less ephemeral nature, a larger number are carried to completion and taken abroad, and there is plenty of scope for new ideas.

PERSONAL.

Mr. ARCHIBALD CADDICK, Chemist and Assistant at the Bath Gas-Works, has been appointed Chief Assistant to Mr. J. W. Helps, of Croydon.

The Spalding District Council have granted an honorarium of £100 to Mr. J. G. HAWKINS, their Gas Manager, in recognition of his extra services in connection with the important extensions of the works recently completed.

The personal estate of the late Mr. A. M. CHAMBERS, Managing-Director of Messrs. Newton, Chambers, and Co., Limited, whose death on the 28th of August last was noticed in the "JOURNAL" at the time, has been valued at £4804; the gross value of the whole of his estate being £24,800.

At their meeting last Wednesday, the Halifax Town Council decided, upon the recommendation of the Water Committee, that during the construction of the new water-works at Walsham Dean, the Engineers for which are Messrs. G. H. Hill and Sons, of Manchester, Mr. J. A. PASKIN, the Corporation Water Engineer, is to have an additional salary at the rate of £200 per annum; his duties to be subsequently defined.

In noticing the New Year honours last week, it should have been mentioned that Alderman KENRICK, M.P., of Birmingham, had been raised to the Privy Council. His municipal career began in 1870, he became an Alderman in 1877, and was Mayor in that year. He filled the position of Chairman of the Gas Committee, and during his tenure thereof he conceived the idea of erecting an art gallery and museum over the Gas Offices. This was done; the whole of the expense being borne by the gas undertaking.

Mr. E. J. SILCOCK, late Borough Surveyor and Water Engineer of King's Lynn, was the recipient last Thursday of a testimonial in the shape of a silver salver and an illuminated address, subscribed for by the present and past members of the Corporation, to express their appreciation of the services he rendered the borough during the years he had held his office. The presentation was made after a "high tea," to which Mr. Silcock had been invited by the ex-Mayor (Mr. A. Jermyn); and it was suitably acknowledged by the recipient. Mr. Silcock is a member of the British Association of Water-Works Engineers.

OBITUARY.

The death has lately taken place of Mr. W. H. ELMY, one of the promoters of the Southwold Water Company, and a Director of the Southwold Gas Company.

A "grand old man" of Hastings, as he has been characterized by a local paper, has just passed away in the person of Mr. WILLIAM BLACKMAN YOUNG, the oldest solicitor in the borough. He was in his 85th year; and among other positions which deceased filled during his long and active life was that of Secretary of the Hastings and St. Leonards Gas Company.

The death took place last Thursday, at the advanced age of 85, of Mr. WILLIAM OVERTON, a prominent inhabitant of Wrexham. Deceased was one of the earliest Mayors after the incorporation of the borough; and he was also a Magistrate and a Justice of the Peace. At the time of his death he was Chairman of the Wrexham Water Company, to which position he was elected on Feb. 13, 1866; having been connected with the undertaking from the commencement. He was some years ago upon the Board of the Gas Company, but retired in 1841, and did not rejoin until 1853. He was Vice-Chairman in 1854, and Chairman for one year only in 1859. He was again elected Chairman in 1869, and held the office until April 6, 1894, when, owing to infirmities, he expressed a strong wish to retire; and the Directors very reluctantly allowed him to do so.

We regret to record the death, on the 3rd inst., at his residence, 18, Rectory Road, Stoke Newington, of Mr. T. I. BIRD, after a short but painful illness. Deceased was the son of the late Mr. Charles Bird, who was for 51 years Outdoor Superintendent of the Rochester Gas Company; and nearly the whole of his life was spent in connection with the gas industry. He was in the service of The Gaslight and Coke Company for 37 years, for 21 of which he held the position of Divisional Chief Inspector. He was a man of conspicuous ability, and was much respected and esteemed by all who had the privilege of his acquaintance. He was a prominent Freemason; being P.M. and Secretary of the "Elliot" Lodge 1567, and Senior P.M. and founder of the "Citadel" Lodge 1897, of which he was first J.W.—reaching the chairs of both Lodges in a little more than three years from the commencement of his masonic career. He was also a P.Z. of the Sir Hugh Myddelton Chapter. He was a large subscriber to the three Masonic Institutions; being a Vice-President of the Benevolent Institution. Mr. Bird leaves a widow and four daughters, two of whom are married to Messrs. T. Matthews and H. Wilkmer, collectors to The Gaslight and Coke Company.

It is with much regret that we record the death, last Wednesday, in his 76th year, of Mr. THOMAS CLAPHAM, of Aireville, Utley, the surviving founder of the well-known engineering firm of Messrs. Clapham Bros., Limited, of Keighley. Mr. Clapham and his brothers were typical of the perseverance and business aptitude which has created one of Keighley's most important industries. Starting in life as a mechanic, Mr. Clapham spent some of his earlier working years in Canada, but returned to join his brother John in establishing the Keighley business. The growth of the concern has owed much to Mr. Thomas Clapham, who was its leading outdoor representative, and who organized the very important gas-plant department. In the "JOURNAL" for Oct. 8, 1895, we recorded the celebration of the golden wedding of Mr. and Mrs. Clapham; and, in joining in the congratulation then offered on all sides, we alluded to the remarkable fact that their long married life had been free from sorrow caused by death in the family. Mrs. Clapham at that time, however, was not in very good health; and she died about a year after the above-named event—her husband surviving her only a little more than two years. They leave two sons and two daughters. Mr. Clapham was for many years associated with the Council of the Keighley Mechanics' Institute, of which he was also a Trustee. He had been on the Council of the Keighley and District Chamber of Commerce, and for many years was a member of the Oakworth District Local Board, of which he had also been Chairman. He was of cheerful disposition and unconventional manner, and had many friends. The funeral took place last Saturday.

NOTES.

The Rapid Analysis of Boiler Feed-Water.

Dr. Thomas Stillman describes in the "Stevens Indicator" a quick method of determining the scale-forming ingredients in a boiler feed-water. His paper is reproduced in the "Chemical News" for the 30th ult., and should be useful to works managers. As the author remarks, the complete analysis of a boiler feed-water presents no difficulty to the analytical chemist; but it is a lengthy business, and is consequently often dispensed with. He has accordingly suggested a scheme of water examination whereby the amounts of calcium carbonate, calcium sulphate, magnesium carbonate, and iron oxide can be rapidly ascertained. Half a litre of the water is evaporated to dryness in a weighed platinum dish, and the amount of residue weighed. This is treated with a half-and-half solution of alcohol in water, and then filtered. The undissolved matter is designated the scale-forming material. This result is not qualitative; and it is often desirable to know whether the scale will be of calcium sulphate, calcium carbonate, or magnesium carbonate. The first is a hard, dense, and difficult scale to remove; whereas the other scales are porous and friable. The scheme of analysis followed by Dr. Stillman is one devised by Professor W. Thain, for the New York Filter Company. It is well spoken of; but the details, being in tabular form, cannot be given here.

A Floor Covering for Engine-Rooms.

A suitable floor covering for engine-rooms, meter-houses, or governor-rooms in gas-works is much needed. According to a report of the United States Consul at Zurich, a new description of material well adapted to this purpose has been invented by M. Gehre, a civil engineer in the town. It is called by the inventor papyristite, from the fact of a pulp made from waste paper entering largely into its composition. It can be used for a variety of purposes, but is specially intended to serve as a solid, impermeable, and jointless roofing or flooring which, when once laid, will present a smooth surface. This new material is stated to be a non-conductor of heat, cold, or sound; and though setting as hard as stone, it has a soft, linoleum-like feel to the feet, and is noiseless. Accumulations of dust, vermin, or fungi are impossible with it. The weight is much less than that of stone or cement. A hundred kilos. of the preparation in a powdered form, when mixed for use and spread to a thickness of 10 millimetres (0·394 inch), will cover a surface of 8½ square metres (91½ square feet). It is mixed and spread exactly like cement, and hardens in 24 hours. After hardening, it takes a good polish, being as hard as marble; yet it preserves a certain degree of elasticity, and can be cut, sawn, or bored. It will take any desired colour, and will stand cold or heat without warping. It is non-absorbent of gases, moisture, or grease. Repairs or patches can be easily effected. If all that is said of this material is true, there should be a future for it.

Electric Traction and High Chimneys.

The progress of material civilization is always attended by a number of incidental variations of the established order of things which do not please everybody. It is notorious how the introduction of central station electric lighting in London and other populous centres has been accompanied by the irruption into quiet neighbourhoods of objectionable steam-power stations, the necessity for which has come to be regarded as a considerable set-off against the advantage of electric lighting. At present there is much clamour for the supersession of horse haulage of tramcars by electricity. It has hardly been realized that such an alteration can only be effected at the cost, among other items, of the erection of very large steam-power stations along the line of route. Much has been made of the intended conversion of the system of the Metropolitan Street Railway Company of New York to electric traction. In a recent number of the "Engineering Record," there is some information showing what this

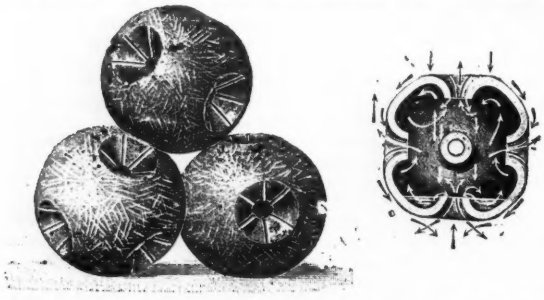
means. There is now being built for the Company in New York City "a new central power station, which, it is safe to say, will be the largest in the world." The station is to house plant and machinery working up to 70,000-horse power. Among other necessaries, the factory chimney is to be the highest in the United States. It will stand 353 feet above its foundations; and the flue is 22 feet in diameter. It is to be built of red bricks, on the cellular plan; the foundation being a concrete block on wooden piling. A pair of three-story boiler-houses will discharge their smoke into this shaft. The greatest calculated weight upon the brick footings is 9 tons per square foot, spread out to 3½ tons per square foot on the concrete block.

The Calorific Power of Weathered Coals.

At a recent meeting of the American Society of Mechanical Engineers, Messrs. R. S. Hale and H. J. Williams presented a paper on the above subject. About two years ago, samples of Maryland, Virginia, Pennsylvania, and Ohio coals were collected and arranged for testing. In the case of fine coal, the samples were ground, thoroughly mixed, and divided into two parts. For tests of lump coal, pieces were taken of about nut size, with alternate lumps from the heap to form two samples. The method of exposure was arranged so as to reproduce as closely as possible the conditions to which the surface of a stack of coal in the open air would be subjected. The samples were analyzed at the end of eleven months; and the average of the results obtained showed that, under the conditions described, weathering decreases the percentage of carbon, hydrogen, and nitrogen, increases that of oxygen, and does not materially alter that of sulphur. The conclusions drawn from an examination of the results are: (1) That weathering decreases by about 2 per cent. the theoretical calorific power, as calculated by Dulong's formula. (2) That it decreases by about one-half per cent. the actual or true calorific power, as shown by the results obtained with the calorimetric bomb. (3) That if the results calculated from the above analyses are interpolated from Kent's curve, which is based on the percentage of fixed carbon, as determined by approximate analysis (the latter being a more or less variable quantity according to the age and degree of exposure of the coal), the remarkable result is obtained that the weathering of a sample of coal increases the percentage of fixed carbon in the combustible, and also augments by about 1 per cent. the calorific power. The results also show that, where coals have not been exposed to oxidation, by weathering or otherwise, there is a reasonably close agreement between the results calculated by Dulong's formula and those obtained with the calorimetric bomb. Finally, they show that, when it is desired to compare the respective calorific powers of coals that have been altered to a greater or less extent by oxidation with those of coals that have not been exposed to the weather, the use of Dulong's formula, or any of its modified forms at present in use, as well as of Kent's curve, would lead to erroneous conclusions.

A Scrubber-Filling Material.

The favourable notice of the chemical trade has been accorded to a new scrubber-filling material offered by the Deutsche Steinzeugwaarenfabrik, of Friedrichsfeld, Baden, the invention of Herr Oscar Guttman. The device is simplicity itself (as will be seen by the accompanying illustration), and only suggests the wondering reflection why the same thing was not done long ago.



The problem of the wherewithal to fill gas-scrubbers is one that constantly presents itself to the industrial chemist. The gas manufacturer began by filling his scrubbers with coke; but when he had learnt to use boards for the purpose, he was content. It is not all gases, however, that are so mild as crude coal gas. In many processes, boards would not stand the action of the gas or of the liquors used for washing it. For all these purposes, Herr Guttman proposes his hollow stoneware balls, which can be made of any size, but are ordinarily 2¼ inches diameter outside. Every ball has six grooved dimples, finishing in a hole; and the effect is that in whatsoever position the balls may rest, the washing liquid is bound to run all over them, and find its way inside. Here it will accumulate in little pockets, from which it must be continually overflowing. It is calculated that the wetted surface per cubic foot afforded by this packing amounts to 37·61 square feet, as compared with 16·42 square feet (computed) in the case of coke. The surface exposed in a board scrubber can easily be ascertained, and will, of course, be governed by the thickness and width of the spacing.

TECHNICAL RECORD.

THE NEW PREECE-TROTTER PHOTOMETER.

A recent number of the "Electrician" contained an illustrated description of a modified form of illumination photometer on the Preece-Trotter principle which has lately been brought out. It is claimed for the new pattern, which is shown in the accompanying illustrations, that, while giving results as accurate as those yielded by the old one, it has the advantage of being less than half the weight and bulk, and (what is perhaps more important) considerably cheaper. The principal objection to the original pattern was that the source of light was a small incandescent lamp worked by a secondary battery. As these batteries are more or less variable, it was found desirable to take a check reading in the laboratory before and after using the instrument. In the new photometer, of which a brief description is given below, an amyl-acetate lamp is employed, which is itself sufficiently accurate as a standard without calibration.

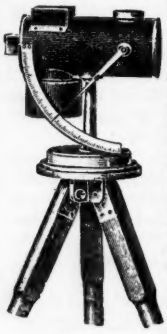


FIG. 1.

Fig. 1 is a general view of the instrument; fig. 2 a sectional elevation, showing the construction. The height of the lamp A is adjusted by screwing the lamp-holder in or out until the top of the flame just touches the point of a bent arm (not shown in the figure), as observed in the mirror M. The cap covering the paper screen S is then removed, and the photometer is set so

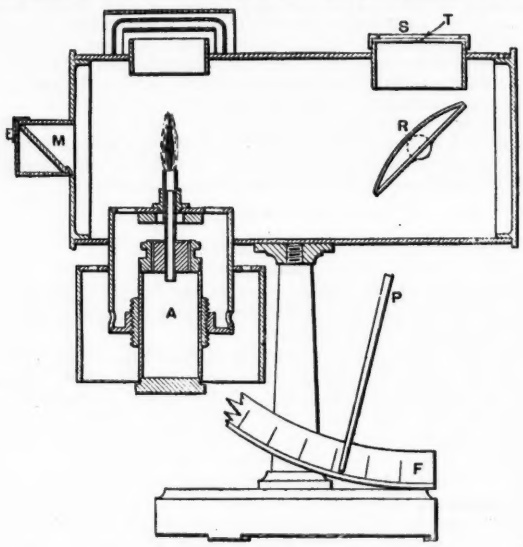


FIG. 2.

that the screen is horizontal. There is a slit T in the screen, through which the inside screen R is seen; and the illumination of the slit is balanced to equal that of the upper screen by turning the inside screen by means of the arm P. A pointer is attached to this arm, and indicates on the scale F the illumination directly in candle-feet. The inside screen has a slightly bluish tint, to remove the colour difficulty to some extent.

EXPLOSIVE MIXTURES OF ILLUMINATING GAS AND AIR.

Particulars have been published of some experiments carried out at the Massachusetts Institute of Technology on explosive mixtures of illuminating gas and air. The cylinder used for the mixture was first thoroughly cleared, and the connections between the cylinder and the atmosphere and the cylinder and the power-pump were then closed. A carefully designed apparatus made it possible to regulate accurately the percentage mixture of the gas with the air. To determine what mixtures had the greatest capacity for doing work, suppose 1 cubic inch of illuminating gas to be used in each of the mixtures, 1–3, 1–4, 1–5, &c., then they would measure 4, 5, 6, &c., cubic inches. If they are placed in cylinders of 4, 5, 6, &c., square inches piston area, the pistons will be displaced 1 inch from the bottom of the cylinder. If the pressure on the piston were the same, equal movements of the piston would give equal power; if, therefore, the mixtures gave equally good results, the mean pressure multiplied by the piston area would, in all cases, be the same.

The mean pressures were obtained from plotting the cards on co-ordinate paper—the same scale being used in all cases. The first fifth of a second only was considered, for in this time the ordinary gas-engine has completed its working stroke. Column 6 of the results of the tests, given below, which are taken from the "Technology Quarterly," show the relative power of the

mixtures. By a similar line of reasoning we get column 12 of the table. As the method here employed is applicable in other cases, it is possible to compare the relative value of any similar explosive mixture.

Mixture (by Parts).	Maximum Pressure (Pounds per Square Inch.)	Time of Explosion (Seconds).	One-Fifth First Second.				One-Fifth Second after Maximum Pressure.				
			Area (Square Inches).	Mean Pressure; Pounds per Square In.	Mean Pressure divided by Proportion of Gas.	Final Pressure.	Area (Square Inches).	Mean Pressure (Pounds per Square In.	Mean Pressure divided by Proportion of Gas.	Final Pressure.	Final Pres. divided by Proportion of Gas.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Gas-Air.											
1—3	45	·49	0·32	11	44	26	1·30	43	172	40	160
1—4	86	·08	1·77	59	295	61	1·88	62	310	46	230
1—5	96	·05	1·86	62	372	52	1·93	64	384	44	264
1—6	88	·05	1·80	60	420	54	1·93	64	448	46	322
1—7	86	·05	1·97	66	528	58	1·93	64	512	48	384
1—8	87	·06	1·71	57	513	53	1 83	61	549	46	414
1—9	77	·08	1·60	53	530	57	1·86	62	620	46	460
1—10	71	·11	1·36	45	495	56	1·69	56	616	45	495
1—11	68	·14	1·21	40	480	60	1·66	55	660	43	516
1—12	39	·33	0·35	12	156	29	0·98	33	429	30	390
1—13	32	·42	0·18	6	84	16	0·79	26	364	24	336
1—14	9	·42	0·05	2	30	4	0·24	8	120	8	120

THE ORIGIN AND DEVELOPMENT OF WATER-GAS MANUFACTURE.

The Dellwik Process.

A recent number of "Progressive Age" contained a translation of an article on "The Dellwik Water-Gas Process," by Herr Geitel, in the "Polytechnisches Centralblatt," in which the following sketch of the earliest processes of water-gas manufacture was given:—

Among gaseous combustibles, water gas (known to the Germans as *wassergas*, and to the French under the title of *gaz à l'eau* or *gaz d eau*) has for many decades absorbed the attention of scientific men. In fact, the properties of this gas are so valuable that we can easily understand their importance from the fact that ever since the second decade of the German Empire the most celebrated men of science have been endeavouring to remove the obstacles standing in the way of the introduction of this valuable combustible.

The manufacture of water gas is based on the discovery of the celebrated Italian chemist, Felice Fontana, that the vapour of water, when conducted through glowing coals is decomposed, a combustible gas being formed. This gas, which is the so-called water gas, is non-illuminating, and has a theoretical composition of equal volumes of hydrogen and carbonic oxide; the weights being respectively 6·67 and 93·33 per cent. The high content of carbonic oxide is found in practice to be considerably lower. This inconvenience is, however, entirely obscured by the high flame temperature, on which account water gas, ever since its discovery, has been destined to be the gas *par excellence* for incandescent lighting purposes, which property is now causing universal attention to be turned anew upon this gas. It may here be remarked that a platinum wire melts in the ordinary water gas flame at 1775° C.

In addition to being used as an illuminating gas, water gas has for many years been employed very extensively in America in a carburetted condition, where the requisite carburetting materials are furnished by the petroleum industry.

It is of great interest to trace historically the manifold changes which water gas has survived since the "twenties" of this century; upheld sometimes by partisan favour, repeatedly laid aside, but always looming up again on account of extraordinary qualities which place it in the foreground of interest in the entire technical world. Such a retrospect seems just at this time all the more interesting as recently, thanks to the Dellwik process, a final change in the estimation in which water gas has heretofore been held is beginning to be inaugurated.

The writer of this article learned at the beginning of the eighties, at the well-known rolling-mills of Schulz and Knaudt, at Essen-on-the-Ruhr, the practical application of water gas, and in the year 1888, through a prize treatise proposed by the Verein Deutscher Maschinen-Ingenieure, he secured the welcome opportunity to make use of the material then collected by him on the subject of water gas. From this prize-work the following statements may be taken: The first authenticated water-gas apparatus was constructed by Vere and Crane in the year 1823, and was patented in England under patent No. 4808 in the same year. In the year 1830, Donovan had already employed water gas in Dublin for public lighting, though without permanent success. In the year 1834, Jobard, the Director of the Royal Museum of Industry in Brussels, was more successful, as he constructed an apparatus in which water gas was generated through the decomposition of water vapour (steam) in upright retorts filled with glowing coals, and carburetted with liquid hydrocarbon. Jobard sold his invention for 10,000 frs. and one-third of the profits to Messrs. Selligue and Tripier, of Paris, with the restriction that Selligue should pass as the inventor. These gentlemen operated with such success that Selligue, on Jan. 18, 1838, received the prize of 2000 frs. for the improvement in water-gas illumination which for several years had been offered by the Société d'Encouragement. Selligue was already on the point of receiving also the cross of the Legion of Honour, when the fact developed itself that he was not the true inventor. Jobard and Selligue were summoned before a Commission composed of the celebrated Physicists and Chemists Thénard, Gay-Lussac, Brogniart, d'Arcet, Dumas, and others; and the Selligue gas (under which appellation water gas had already been known for many years) was forthwith divested of its false title.

The Jobard gas has been employed for public lighting purposes in different cities—for example, in Dijon, Antwerp, and Strasburg, &c.; and for this prestige it is indebted to the great activity of Selligue. In Paris, the royal printing establishment was lighted by means of this gas. Munich was also about to adopt this mode of illumination. Jobard characterized the value of his invention in a treatise published in the "Bulletin du Musée de l'Industrie" in the year 1846 as follows: "I cannot, therefore, be accused of extravagance if I attach some value to a process, the principle of which consists in the decomposition of water—a substance without value—by means of coke, whose value is very little, so that 1 lb. of shale oil employed with it, and costing ¼d., feeds a burner during a space of 20 hours, and gives a light equalling that of 10 candles."

By degrees the Jobard gas, which had been greeted on all sides with the greatest interest, disappeared from the contemporary journals and publications. In the forties, the process of water-gas manufacture of Leprince, White, and Gillard was again revived, but without lasting success. This manufacture comprised that of both carburetted and incandescent illuminating gas. Water gas found a more important application in the years 1856-1865 for lighting the city of Narbonne, in Languedoc, in which operation platinum baskets were heated to incandescence by means of this gas. The gas is said to have contained 3 to 4 per cent. of carbonic oxide. In the year 1867, Messrs. A. Pütsch, C. Westphal, and Ziurek brought forward the project of illuminating the city of Berlin with water gas. The chief features of this enterprise, which unfortunately did not come to a successful issue, were that the gas was to be generated in the vicinity of the Fürstwald Lignite mines, and by means of pumps of 1400-horse power, forced through a 4-inch pipe to Berlin.

The author then referred to the constantly-increasing application of water gas, for both lighting and heating purposes, in America, and concluded with a few observations on the latest appearance in the domain of water-gas technics—viz., the Dellwik patent—which he said had completely revolutionized the process of manufacture of this gas. Water-gas plants on the Dellwik system have, he says, been established or are in process of construction at the following places:—

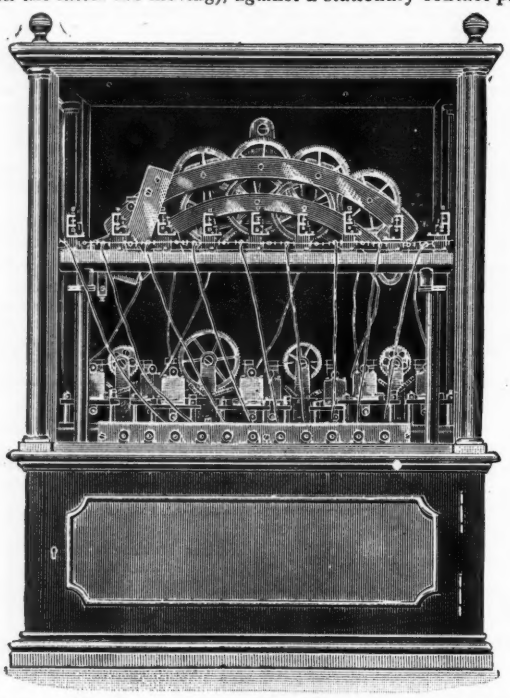
Places.	Capacity of Production per Hour in Cubic Metres.	Application of the Water Gas.
Sosnowice (Russian Poland)	500—650	Welding steam-boilers, &c., and annealing.
Laura Metallurgical Works (Upper Silesia).	250—320	Welding parts of battle-ships, steam-boilers, &c.
Stockholm (Sweden).	100—130	Glass blowing and manufacture of incandescent lamps.
Lünen and Lippe (Westphalia).	100—130	Production of fine glass, running gas-engines, heating and boiling, illumination.
Warstein (Westphalia).	100—130	Illumination, heating and cooking, and experimental purposes.
Duisburg.	100—130	Welding steam-boilers, &c.
Brummen (Holland)	25—40	City illumination, heating, cooking, &c.
Lennep (near Remscheidt).	25—40	Soldering, drying-ovens, heating, and illumination.
Manchester.	150—200	Annealing furnaces and steam-boiler firing.
Turin.	50—60	Glass blowing and the production of electric incandescent lamps.
Augsburg.	50—60	Driving motors, annealing, and illumination.
Königsberg.	250—320	City illumination.

The Sale of Calcium Carbide in New York.—Strict regulations as to the sale and use of calcium carbide and acetylene in New York have been adopted by the Fire Department. According to the new rules, all calcium carbide in transit through the city and on storage must be enclosed in hermetically-sealed iron receptacles, and plainly marked "Calcium carbide; dangerous if not kept dry." No single package must exceed 100 lbs. As to the sale of the carbide, not more than 20 lbs., either in bulk or in cartridges, can be stored or kept in any building used for dwelling or mercantile purposes, and this amount can only be kept on a permit obtained from the Fire Department. This permit will provide that all quantities in excess of 2 lbs. shall be in tight metal packages, and kept elevated at least 6 inches from the floor, in a fireproof safe located above the street-level. The manufacture, transportation, storage, sale, or use of liquefied acetylene is absolutely prohibited within the limits of New York. Provisions are made for the storage of calcium carbide in sealed receptacles in quantities not exceeding 100 lbs. in isolated buildings of fireproof construction. The storage must be with a permit from the Fire Department, and the entire quantity stored must not exceed 500 lbs. in the aggregate.

PADFIELD AND SETTLE'S ELECTRICAL RECORDER.

In these days of high-pressure competition, when the time of the engineer and manager, and often his energies, are unduly taxed, it is of importance that he should possess a thoroughly reliable instrument that will assist him in his duties; and the advantage to a gas or water works manager of being able, when seated in his office—often located a long way from the works—to ascertain at a glance the make of gas and the stock of gas in the holders or the amount of water in the reservoirs, will not, we think, be questioned. The invention about to be described is applicable to recording at a distance the quantity of gas, air, or other fluid contained in any vessel; but, for convenience, it will be described here in connection with a gasholder.

The working mechanism consists of a contact-maker actuated by the rise and fall of the holder; and in connection with the former appliance is an index apparatus operated electrically. The contact-maker consists of a shaft worked by a counter-weighted chain and pulley arrangement, or in any convenient way, from the holder, the rising of which operates one way, while the weight operates in a contrary direction—the shaft making one rotation for each foot of movement of the holder. On the shaft are insulated metal discs or arms, carrying pivoted contact-pieces, and having a rubbing connection with the wire from one pole of a battery. Each of these contact-pieces is intended to strike, once at each rotation of the discs (according to the direction in which the latter are moving), against a stationary contact-piece,



in order to close a circuit through the index apparatus to the other pole of the battery. The index apparatus consists of a vertical spindle having on its upper end a pointer which works over a dial marked for each foot of the height of the gasholder, representing a certain number (say 1000) cubic feet of gas. Below the dial there is mounted on the spindle a wheel operated by pallets controlled by electro-magnets in the circuit. The pallets, of which there may be two, are mounted on one end of a rocking arm, the other end of which carries an armature. The upward movement of one pallet will turn the wheel the distance of half a tooth, while the downward movement of the other will turn it another half tooth—representing on the dial a movement equal to one foot. This operating mechanism is in duplicate on either side of the wheel—one set being for the rising and the other for the falling holder. When a continuous movement in one direction only—as, for example, in a station meter—is required, only one pallet arrangement is necessary; the ordinary meter index being used, fitted with a suitable pallet-wheel arranged to indicate (say) each thousand cubic feet passing through.

The arrangements here described are, of course, subject to modification, so as to adapt them to the various purposes for which the invention is applicable. The mechanism is shown in the illustration, which is a back view of the recorder; the front being of neat design, and the whole constituting a handsome as well as useful addition to an engineer's office.

The arrangement for fixing the recorder is exactly the same as for the telegraph or the telephone—*i.e.*, overhead wires and earth connection. The contact-makers on the gasholder are specially designed to render it impossible to remain in contact if the holder is nearly at a standstill. The contact is instantaneous, and must be either off or on instantly.

Those of our readers who attended the Bath meeting of The Gas Institute in June, 1897, will doubtless remember that the apparatus was on view on that occasion; and it was also exhibited at the recent meeting of the Southern District Association in London. It has been in operation for twelve months at the Exeter Gas-Works in conjunction with the station meter; but one has just been made for the new offices of the Company, to record for four gasholders and a station meter. Mr. Padfield, the Company's Engineer and Secretary, will thereby be enabled to ascertain the exact position of the stocks and to read the station meter at any time.

NEW CONDENSING GAS-STOVES.

A pleasing exterior, high efficiency for a moderate consumption of gas, cheapness, and strength are all the points that a gas heating-stove of any type requires to commend it to favour; and it can honestly be said that these merits are fully possessed by the two new condensing-stoves which Messrs. Fletcher, Russell, and Co., Limited, have recently placed on the market. To these the names of "The Tower" and "The Turret" have been given; but the differences between them are mainly in their size and outward design. The former is the larger of the two; and it is claimed for it that it has the greatest heating surface, and is the most powerful, of any condensing-stove yet introduced. Support is given to this statement by the fact that a maximum consumption of only 16 cubic feet of gas is found sufficient for the warming of a room 25 feet square. The great effective surface of the stove is secured by a patented arrangement, some idea of which can be gathered from the brief description given in our "Register of Patents" on the 6th ult. Generally described, the body of the stove is built of sheet iron, with an ornamental cast-iron casing; and the side tubes are of enamelled copper or brass. In the base of the stove, the firm's well-known "Fireglow" pattern of fire has been adapted, which, imparting to it the warm and bright appearance of an open fire, is a great relief from the old type of condensing-stove. Its full dimensions are 5 ft. 1 in. high, 2 ft. 6 in. wide, and 1 ft. 8 in. across the tubes; and the total depth from back to front of the base is 15 inches. To any large apartment or hall in which an ordinary ventilated gas-fire cannot be used, it will form a very handsome and useful addition. In times past a common cause of aversion to condensing-stoves was the emission, through their imperfect action, of an unpleasant odour; but the "Tower" stove, as we can testify from an inspection of one in use, proves that this defect has now been completely overcome. The "Turret" stove is constructed on similar principles; and, in its degree, it has all the good qualities of its fellow. It is only about half the height, but is equal to the heating of an office or hall 10 to 11 feet square.

Sugg's Gas Engineer's Pocket Almanack and Lighting Table for the Year 1899 has been issued in the form which has now become familiar to many of our readers. It contains the usual series of useful tables and illustrated particulars of the firm's burners, lamps, photometers, stoves, and other appliances. The inclusion of the Gas Referees' revised Instructions, with illustrations of their apparatus, makes this year's edition of the pocket-book specially interesting to gas managers.

Pipe Capacity and the Flow of Water.—"Kálkulos sobre las Kañerías de Agua" is the title of a work extending over 240 pages in which the author—Señor A. E. Salazar, Professor of Industrial Physics at the University of Chile—has attempted to unify the usual formulæ for water-pipes, and to simplify the calculations based upon the flow of water therein. Señor Salazar is joint author with Mr. C. Newman of a work on "The Chemical and Bacteriological Examination of Potable Waters," published eight years ago. In that work, as in the one under notice, he displays a thorough grasp of his subject. The book is exceedingly well printed; but the adoption of what is called "rational" (*rrazional*) orthography gives the matter a somewhat strange appearance. The text is accompanied by tables and diagrams; and there is an index. The publisher is Hume I. K.A, Aumada, 357, Santiago de Chile.

Oil v. Gas Engines for Pumping.—At the last meeting of the New England Water-Works Association, a paper was presented by Mr. F. C. Coffin, in which he gave the results of some investigations conducted by him into the capabilities of gas, gasoline, and oil engines for pumping purposes. He says his experience is in favour of a well-designed oil-engine, which will raise a million gallons 1 foot high for each gallon of oil consumed. This allows the engine 1 lb. of oil per horse power per hour, and gives the pump an average efficiency of 65 per cent. From tests made by others, it is estimated that a first-class gasoline engine plant will do the same amount of work with the consumption of 0·9 gallon of fuel. With regard to gas-engines, there is so much difference in the quality of the gas that it is difficult to make an estimate as to the consumption of this fuel. Mr. Coffin states, however, that 130 cubic feet of "good city gas" will do the same work as a gallon of oil. On this basis, the cost of fuel for pumping a million gallons of water 1 foot high will be as follows: With oil at 9c. per gallon, 9c.; with gasoline at 9c. per gallon, 8·1c.; with gas at $1 per 1000 cubic feet, 13c.

REGISTER OF PATENTS.

Combined Condenser and Tar Extractor.—Blakeley, J. F., of Ravensthorpe. No. 28,434; Dec. 2, 1897.

In the case of the annular form (as shown in fig. 1) being adopted, instead of the usual gas chamber A being a clear space, it is filled with a spiral screw form of plates B from top to bottom, with water or liquor passing down them. In this way, the gas (in contact with the underside of the spiral plates) is assisted in depositing its heavy compounds—the water cooling and also carrying off the products of condensation. In a set of condensers (say) of four columns, two only may be adapted with water or liquor distributing apparatus, and the spiral plates be perforated to cause a greater sub-division of the gases, and allow the water to pass through and intermingle with the gases in their ascent.

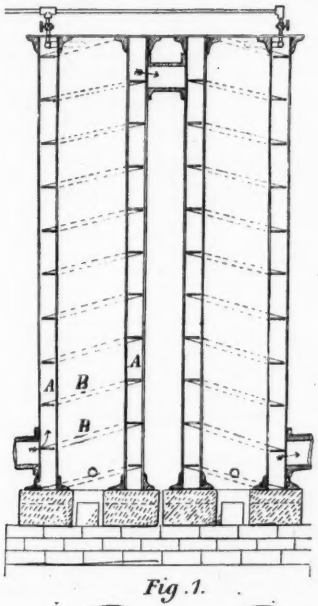


Fig. 1.

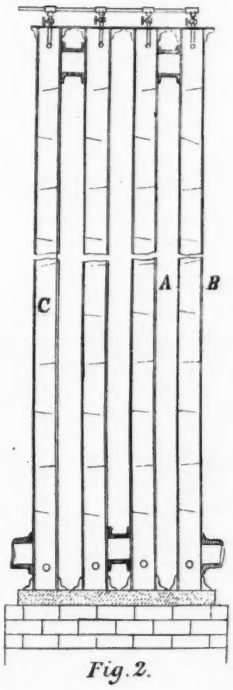


Fig. 2.

If applied to the oblong form of condenser (fig. 2), a series of baffle-plates C cause the water to overflow from the upper tiers to those below in a zigzag direction. In the bottom chambers of the last condensers, a water-chamber may be arranged to act as a washer or extractor for the gas to pass through, before exit to the scrubbing plant.

Gas-Taps.—Yates, H. J., of Birmingham. No. 29,218; Dec. 10, 1897.

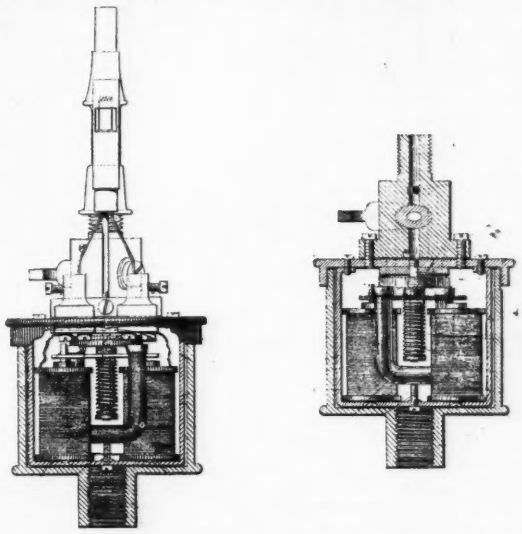
This invention relates to taps for cutting off and controlling the supply of gas to two or more burners, pipes, or passages, when fed from a single inlet or supply. The object of the invention is (1) to combine in a single tap means for completely turning on gas for two or more burners, and to regulate the supply of gas to them; (2) to supply gas to only one or more burners, the supply to the other burner or burners being meanwhile cut off; and (3) to admit only a bye-pass supply of gas to one burner, the other burner meantime having a full supply.

Electric Gas Lighting and Controlling Device.—Kerridge, J. H., of Beccles. No. 29,361; Dec. 11, 1897.

According to this invention, the chamber into which the gas-pipe leads is preferably arranged in proximity to the burner; and a rotary valve in the chamber is carried by a permanent magnet and combined with an armature in such a manner that, upon excitation of an electro-magnet, the valve will be removed from its seat, rotated, and replaced upon its seat again—by a spring, if necessary. The supply of gas is thus turned off or on. The movement of the valve, in addition to admitting gas to the main burner, allows a temporary supply to pass to an igniting burner, where ignition takes place owing to the presence of an electrically heated wire coil or other body formed of platinum or the like; while a commutator arranged in the electrical circuit enables the current through the electro-magnets to be reversed at will—thus a reversal in the movement of the permanent magnet and gas-valve are obtained.

A convenient way of carrying out the invention is (as shown in the engraving) to mount the main burner upon the top of a cylindrical casing, in the upper part of which are arranged the ports of the gas-valve. These may conveniently be three in number—one for the supply of gas to the main burner, one for admitting gas to the igniting burner, and a third (which is not actually closed by the valve) allows of the passage of gas in the event of failure of the electrical apparatus. The passage through which the gas passes from this port is controlled by a screw-valve or some other device easily operated from the exterior. A central pin projecting downwards from the upper surface of the casing serves as a pivot for the rotary valve and permanent magnet, to the ends of whose arms the valve is conveniently attached. Upon this central pin is also carried a soft-iron armature, and a spring tending to hold the armature up against the valve and the latter against its seat. An electro-magnet is held conveniently in a stirrup-shaped piece, so that the coils are located upon either side of the central pivot-pin; the armature being arranged to lie opposite the poles of the electro-magnet, and to be there held against rotation, but free to be attracted when the magnet is excited.

When a current flows through the electro-magnet, the armature is drawn down against the action of the spring; the valve at the same time dropping off its seat and rotating owing to the attraction of the poles of the permanent magnet to the opposite poles of the electro-magnet.



When the current through the electro-magnet is turned off, the spring once more raises the armature, and brings the valve up against its seat; while reversal of the current causes a similar action, but a movement of the valve in the opposite direction.

The illustration shows the arrangement of parts—the permanent magnet and valve being in the positions occupied by them when the gas is turned off and when it is being admitted to the burner, respectively.

Sealed Padlocks for Automatic Meters.—Layton, A. E., of Redditch. No. 5868; March 10, 1898.

This invention consists essentially in providing the cover-plate or scutcheon of the lock with a hook or other projection adapted to be engaged by one part of a suitable seal or tie, and having at another part a hole which is placed over or coincident with the shackle hole of the lock, and through both of which the end of the shackle passes when forced into its locking position. In this way, the shackle and key-hole cover-plate are coupled together by a sealing link or tie, which is preferably made of soft lead or other substance that will indicate any attempt that may be made to clandestinely disconnect the shackle and cover-plate in order to gain access to the key-hole. The cover-plate or scutcheon is hinged or pivoted in such a manner, and the sealing-link is of such a length, that when the key-hole is covered by the scutcheon and the shackle snapped home, the link will have to be damaged before the key-hole can be again uncovered.

Lighting and Extinguishing Street-Lamps.—Justice, P. M.; a communication from A. G. Kent-Johnston, of Sydney, New South Wales. No. 21,285; Oct. 10, 1898.

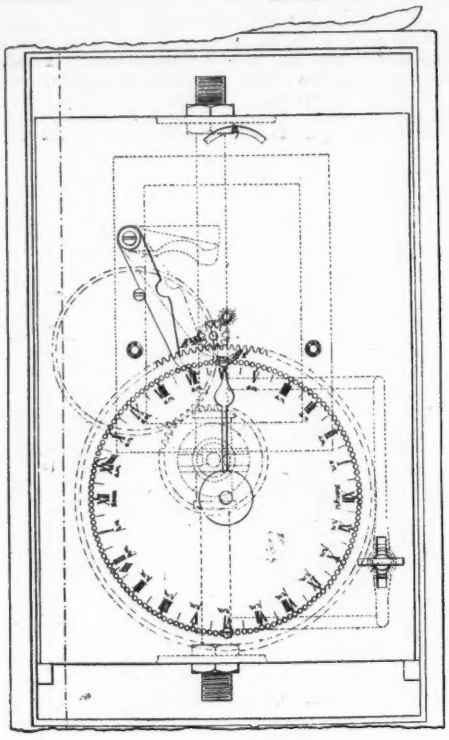
The patentee proposes to provide that any number of lamps may be simultaneously lighted or extinguished from a common centre, by means of a horizontal plunger-valve, which crosses, at right angles, the gas-supply pipe. The plunger-valve is provided with two armatures, one at each end, in connection with two or more electro-magnets; so that, according as one or other of the magnets is switched into circuit, the valve will be drawn in one or other direction, and the supply of gas will either be allowed to flow through to the burner or will be cut off from it. This effect may be produced in many ways; but he prefers to construct the plunger-valve with an annular groove, so arranged that when the groove is in an axial line with the gas-supply pipe and the burner, the gas is free to pass, by way of the annular groove, to the burner, but when the groove is not in such line, the gas supply is cut off from the burner.

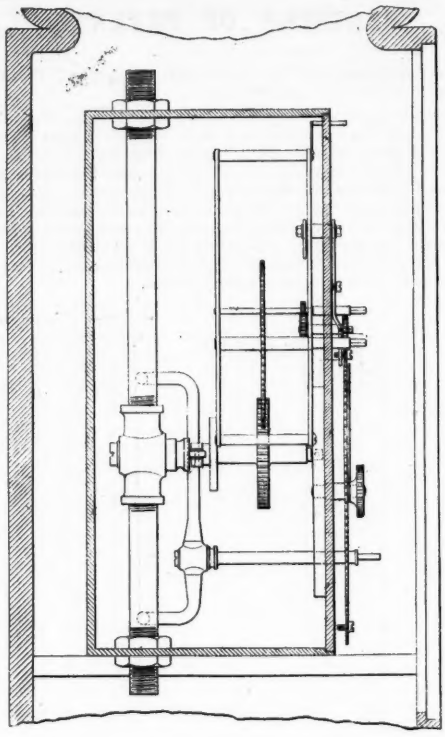
For lamps with an ordinary fish-tail or batswing burner, the movement of the plunger-valve is so regulated that the annular groove shall not pass quite clear of the passage that leads to the burner; and thus a small quantity of gas will be allowed to pass—sufficient to leave a pilot-light at the burner. For lamps with incandescent burners, the annular groove is so operated as to pass quite clear of the gas-passage, and thus cut off all supply of gas. A separate small gas-way is provided, independently of the plunger-valve, terminating in a pilot-burner, so that when the lamp is extinguished by the longitudinal motion of the valve a pilot-jet will remain alight within the mantle. The electro-magnets if connected with a central station would be switched in or out of circuit at will, with the result that the plunger-valve would be drawn in one or other horizontal direction, and the light turned up or extinguished as desired.

Automatically Raising and Lowering the Light in Street-Lamps.—Firth, A., of Bradford. No. 1641; Jan. 21, 1898.

The patentee proposes to employ a timepiece or clockwork mechanism arranged to operate a valve or tap in the gas service-pipe, and turn the gas on and off when required—the tap or cock being arranged not to turn the light quite out, but to leave a small light during the day ready to be turned up at night.

The mechanism shown (next page) consists of an ordinary timepiece fitted with a separate train of wheels, similar to the striking train of a striking clock. The plug-tap used to turn the gas on and off is provided





with a toothed wheel fixed to it, and engaging the toothed wheel of the spring barrel employed to drive the separate train; and each time such train is put into operation, it is constructed to remain in motion long enough to turn the plug-tap just a quarter of a revolution, and turn the gas either off or fully on. A bye-pass is fitted to supply the gas for the pilot-light. To put the separate train into operation at the required intervals, a disc or wheel is driven by the timepiece in a similar manner to the hour-hand of an ordinary timepiece, but in this case preferably only revolving once in 24 hours. A number of adjustable studs or pins are provided, which project through the disc or wheel; and each time one of the studs reaches a certain position, its end projecting through the disc starts the separate train and causes the gas to be turned up or down as the case may be. Assuming, for example, it is required to light up at six p.m. and turn down the gas at six a.m., a stud would be put into the hole in the disc at VI. in the a.m. half of the disc, and another at the VI. of the p.m. half; and then the disc would be set by the fixed pointer to the time of day, so that (at the required time) the studs would be successively brought into position to put the separate train into operation.

Water-Meters.—Eisner, W., of Berlin. No. 21,977; Oct. 19, 1898.

This invention relates to the class of water-meters in which a large and a small meter are coupled together and controlled by a weighted piston-valve, which is capable of being reversed so as to allow considerable quantities of water to pass through both meters simultaneously, while small volumes are drawn off through the small meter only. This arrangement, however, has the serious drawback of not correctly registering mean discharges of water, owing to the fact that the small meter remains always fully open, while the volume of water flowing through the large meter is insufficient to enable the large meter to register correctly. To overcome this defect, and avoid faulty registration, the patentee proposes to provide the meter with a reversing valve, by means of which, broadly speaking, each of the two meters (coupled together after any well-known manner) is operated independently of the other. Only at the moment of reversing the valve, when it is in one certain position, does it occur that both meters act together for a short time; and this merely for the purpose of facilitating the completion of the reversing movement of the valve. This simultaneous action of the meters is, however, of such duration only as to keep the incorrectness of record within unimportant limits for all practical purposes.

APPLICATIONS FOR LETTERS PATENT.

27,294.—Wright, T. B., H., & J., "Valves for regulating the flow of water and other fluids." Dec. 27

27,309.—Larsen, E. M. J., "Dry distillation of wood, wood refuse, coal, peat, and the like." Dec. 27.

27,326.—Friebel, E., and Näke, R., "Obtaining acetylene gas." Dec. 27.

27,329.—Monplot, C., "Public lighting apparatus." Dec. 27.

27,337.—Mills, B. J. B., "Gas-burners." A communication from La Société Anonyme des Fontaines à Gaz. Dec. 27.

27,342.—Blaasch, H., "Strengthening incandescent gas-mantles." Dec. 27.

27,347.—Jones, G. B., "Combined generator and burner." Dec. 27.

27,351.—Bickerton, H. N., and Bradley, H. W., "Oil and gas engines." Dec. 28.

27,383.—Russell, B., "Double acting gas and petroleum motor engines." Dec. 28.

27,389.—Theisen, E., "Purifying gases and obtaining constituents or bye-products contained therein." Dec. 28.

27,390.—Abel, C. D., "Coin-freed apparatus for meters." A communication from the Société Anonyme Continentale Pour la Fabrication des Compteurs à Gaz et Autres Appareils. Dec. 28.

27,399.—Cooper, T., Thomas, J., and Still, W. M., "Gas-lamps." Dec. 28.

27,410.—Waddell, C. J., "Taps and cocks for fluids." Dec. 29.

27,416.—Clay, W. R., "Incandescent gas-burners." Dec. 29.

27,449.—Bertheau, H. A., "Gas and other engines." Dec. 29.

27,478.—Harding, R. & G., "System of water supply and storage on the main." Dec. 30.

27,523.—Kellner, F., "Automatically conveying coke from the retort furnaces or ovens to the coke yard." Dec. 30.

27,545.—Windham, F., "Acetylene lamps." Dec. 31.

27,561.—Walker, H., "Burners for acetylene and other gases." Dec. 31.

27,572.—Milne, J., and O'Connor, H., "Indicating variations in the quantity of gas, air, or other fluid contained in a test holder." Dec. 31.

27,584.—Pipe, H., "Gas-burner." Dec. 31.

27,588.—Stockstrom, C. A. & L., "Vapour burners." Dec. 31.

27,591.—Adams, M. J., "Gas lighting apparatus." Dec. 31.

27,600.—Riegel, A., "Gas or petroleum engine." Dec. 31.

27,604.—Kellett, J. T., "Internal combustion engines." Dec. 31.

27,618.—Schmidtt, L., "Acetylene gas-lamps." Dec. 31.

27,621.—Beecroft, W., "Gas-heated irons." Dec. 31.

27,629.—Lake, H. H., "Pressure-reducing valves." A communication from T. J. Kieley and F. T. Mueller. Dec. 31.

27,632.—Streubel, C. G. A., "Street and like lamps." Dec. 31.

27,633.—Streubel, C. G. A., "Gas-cocks having igniting arrangements." Dec. 31.

Completion of the Morley Gas-Works Purchase.—The concluding stage of the lengthy proceedings between the Morley Corporation and the Morley Gas Company with regard to the purchase of the gas undertaking has been reached. It will doubtless be remembered that the arbitration before Mr. J. Mansergh ended in an award fixing the price at £109,866. Since that time, the title to the various properties belonging to the Company has been investigated by the Town Clerk of Morley (Mr. R. B. Hopkins); and last Thursday the purchase was completed. The total amount paid was £114,480 17s. 4d.; the difference between this sum and the amount of the award being represented by dividends on the capital of the Company from the 30th of June last, and costs in connection with the parliamentary and arbitration proceedings. The Corporation acquire with the gas-works the reserve fund, insurance and contingent fund, and balance to the credit of profit and loss account, amounting together to about £10,000; and also certain freehold property not at present used for the gas-works.

The Quality of Gas at Birkdale.—At the monthly meeting of the Birkdale District Council last Tuesday, Mr. Hartley drew attention to the minutes of the Gas Committee, and said he should like to know if at the meeting of that body there had been any discussion on the illuminant—he would not like to call it gas—that they had been supplied with in Birkdale lately. He had it on the very best authority that the gas as sent into Birkdale had never been worse than it was at the present time; and considering the price charged for it, it was about the worst gas in England. He would like to ask whether the Town Clerk of Southport had supplied them with a copy of the report which a gas expert—Mr. Corbet Woodall—had made upon the Southport Gas Estate, and if not whether the report was open to the inspection of any ratepayer in Southport. The Chairman (Mr. T. O. Clinning) said they had had no discussion on the subject in Committee, and no report had been supplied to them by the Town Clerk of Southport. Mr. Hartley then moved that formal application be made for the report; also that the Town Clerk should be asked if it was open to the inspection of any Southport consumer. The resolution was carried unanimously.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

Carburation of Coal Gas.

Sir,—I am afraid your readers will think this correspondence has reached an inordinate length; and, so far as I am concerned, I propose to make this my final communication on the subject, unless some fresh points crop up.

In my last letter I pointed out the difficulties in replying to every point that can be raised; and when points are confused, it makes it doubly difficult to do so. Thus in Mr. Young's last letter, referring to the amount of oil recovered from the drip-wells, he states that from the quantity this cannot be considered "too small to be evident." Now if Mr. Young will kindly refer to my letters of Nov. 25 and Dec. 13 and 27, he will find that the two points referred to have no analogy. The drip-wells are on the works from which the quantity of oil was recovered; whereas the quantity "too small to be evident" referred to the suggested deposits of hydrocarbons in the ordinary condensation found in the street syphons.

Now, with regard to the artificial vapour-tension theory, this has never been advanced by us *except as a theory* (see "Transactions of the Institution of Gas Engineers," 1897, p. 128), and is of course open to question. But then the effects produced are similar; and there may be some other cause unknown, and which accomplishes the effects of the carburation process. That the oil-mist (besides preventing the formation) dissolves the previously precipitated naphthalene (when present) and carries it to the burner, *is a fact of which we are perfectly sure;* and it can be demonstrated at any time by experiment (see p. 88 of the "Transactions of the Institution of Gas Engineers," 1897).

The very important point raised by Mr. Young, as to the amount of naphthalene in coal gas and its value as an illuminant, I regret has not been investigated by us. In the experiments made by us both in the condensation and by spraying oil (see p. 86 of the "Transactions of the Institution of Gas Engineers," 1897), no doubt other hydrocarbons were precipitated with the naphthalene; and in practice it would be difficult to take one and leave the other.

As regards the other matter referred to by Mr. Young—viz., the use of carburetted water gas as a preventive of naphthalene deposits—I have repeatedly pointed out that the utility of the carburation process had been proved *before* the introduction of carburetted water gas at Hastings, although the point alluded to has not been lost sight of by us (see "Transactions of the Institution of Gas Engineers," 1897, p. 103); and there is no doubt that where carburetted water gas is made of a semi-permanent character, it will partially accomplish similar results to the carburation process. But it does not pay to make gas in this manner; and where high candle-values are obtained, naphthalene deposits will still exist. The cost of working the carburation process is so small by comparison as to be hardly worth consideration, in view of the results accomplished.

Mr. Young states that he does not doubt my honesty in the facts I have stated; and I can assure him that, if I have wandered into the realms of fiction, it has been unconsciously on my part. Perhaps three years' experience in carburation may have converted fiction into fact. Anyhow we have secured an immunity from naphthalene troubles, which is something to be thankful for; and if the means employed cannot be found to harmonize with well-known laws of Science, and mechanical effects do not satisfactorily explain it, we here at any rate shall remain content while its beneficent effects continue, and endeavour to prosecute our investigations when time admits.

Hastings, Jan. 7, 1899. CHAS. E. BOTLEY.

LEGAL INTELLIGENCE.

Abstracting Money from a Prepayment Meter.

At the Southwark Police Court on Friday, William Buckman, a boy of sixteen, was sentenced to two months' imprisonment, with hard labour, for stealing 11s. 4d. from a prepayment gas-meter at his parents' residence in Queen's Buildings, Southwark. The prisoner had been previously convicted of felony, and was then bound over to come up for judgment if called upon.

An Agitator's Conviction.

At the County of London Sessions, Clerkenwell, last Friday, Mark Hutchens appealed against a conviction for assaulting Samuel Lawrence, a conductor in the service of the North Metropolitan Tramways Company, for which he was sentenced to fourteen days' imprisonment with hard labour, at the Thames Police Court, on the 20th of September. Hutchens has been for nine years the paid President of the Gas Workers' Union, consisting of 42,000 members, and for the past four years has been a member of the East Ham District Council. The Bench upheld the conviction and sentence, with costs; and the result will be that Mr. Hutchens will lose his seat on the Council.

The Assessment of the Liverpool Water-Works.

At the Montgomery Quarter Sessions last Thursday, the judgment of the Queen's Bench Division of the High Court of Justice on the 7th of November last, reducing the assessment of the Liverpool Water-Works at Llanwddyn by the Llanfyllin Union to £12,037 gross and £9630 net, as recorded in the "JOURNAL" at the time, was entered on the application of Mr. Honoratus Lloyd, as the judgment of the Sessions Court. By consent of Mr. F. Marshall, Q.C., representing the Assessment Committee of the Union, it was ordered that the costs should be taxed out of Court, such taxation to be postponed until judgment was delivered in the further appeal by the Committee. With respect to the appeal by the Corporation as affecting the assessment of their property in other parishes, further respite of hearing was granted pending the decision of the Higher Court in other cases; but Mr. Lloyd intimated that an arrangement might be come to.

Unlawful Use of Water.

At the Sedgley Police Court, on Monday last week, before Mr. Neville (Stipendiary), William Smart was charged by the South Staffordshire Water Company with unlawfully using a wrong service of pipes, and William Hampton, landlord of the Horse and Jockey Inn, Upper Ettingshall, was summoned for causing or permitting the alleged irregularity. Dr. Showell Rogers, who appeared on behalf of the Company, said that Hampton was the owner of the public-house and several of the adjacent cottages. The water was supplied to the former by meter, and to the latter at the "domestic" rate. It was found on the 11th ult. that water was being conveyed from the cottages to the public-house by means of an india-rubber pipe; and the assumption was that this device was employed to obtain water for brewing at a reduced rate. Evidence having been given in support of the charges, Mr. W. A. Foster, who defended Hampton, denied that his client had ever caused or permitted the alleged offence to be committed. Smart said he had not any intention of committing an offence. The water was only used for swilling purposes. A servant stated that the water was used from the "domestic" tap because the key of the meter-tap had been lost. Hampton said he was not at home at the time of the alleged offence; and directly he ascertained that the key of the meter was missing, he gave instructions for another to be obtained. Replying to Dr. Rogers, he emphatically denied having at any time given instructions for the offence to be committed. The Stipendiary said the Water Company had very properly brought the case before the Court. So far as Hampton was concerned, it was a case of suspicion, but he would give him the benefit of the doubt, and the charge against him would be dismissed. Smart was fined 20s. and costs, or in default one month's imprisonment.

The Alleged Defalcations by the Gas-Works Clerk at Stafford.

At the Stafford Borough Police Court, last Thursday, before Messrs. B. P. Wright and J. Podmore, Albert William Neighbour was charged on remand (see *ante*, p. 33) with the falsification of books relating to the Gas and Electricity Department of the Stafford Corporation. Mr. B. C. Brough prosecuted; and prisoner was defended by Mr. Burke. In opening the case, Mr. Brough stated that prior to the 13th of December last prisoner had been in the employ of the Corporation as a clerk at the gas-works for nine years. He entered as a youth, and by steps rose to the position of Chief Clerk, who was also Cashier. In the early part of 1896, Mr. Wildes, the then Chief Clerk, became ill, and prisoner did his work; another clerk being introduced to take prisoner's place. As there was no probability of Mr. Wildes returning to his duties, the prisoner, in April, 1897, was appointed Chief Clerk. In a document he had drawn up, the prisoner stated that at this time there was no deficiency in the accounts. However, he very shortly afterwards began to abuse the confidence reposed in him. In addition to the prisoner, there were also employed in the general office a young man named Arthur Botteley, the senior clerk, and John Hebbert, the collector. Remittances by post were chiefly of large sums, and were generally by cheques, which, on being received by the Manager (Mr. J. F. Bell), were handed to prisoner, or, in his absence, to one or other of the clerks. Smaller payments were made in cash over the counter. Mr. Hebbert had a separate book for cash received by him; but prisoner and Botteley used a joint book. These books were called "counterfoil receipt-books." Having explained the arrangement of the books, and the system of making the entries, Mr. Brough stated that on Feb. 15, 1897, a cheque for £130 10s. 9d. was received from Messrs. Hardman and Co., chemical manufacturers, Milton. Prisoner gave a receipt for it to the firm; but he filled up the counterfoil with the sum of 1s. 6d., which had been paid over the counter. A second case went back to June 6, 1896. On April 11, a cheque was received from the Staffordshire Infirmary for £40 2s. 3d.—£20 8s. 9d. being for gas, and £19 13s. (less discounts) for products. Prisoner gave one receipt for the full amount, but it did not figure as one sum in the counterfoil receipt-book. He used two counterfoils—entering the amount paid for gas in one, and that for products in the other. This gave him a blank receipt for use on a future occasion. On May 12, 1896, Messrs. Hardman paid a cheque for £68 7s. 8d., and prisoner gave a receipt for it on the form which should have been used for the Infirmary account. Prisoner did not debit himself with this cheque until June 6, when he entered its receipt on a counterfoil, which gave him another blank receipt to use. The third case related to Aug. 14, 1896. On that day Messrs. Hardman forwarded a cheque for £66 15s. Prisoner sent a receipt; but on the corresponding counterfoil he did not enter the amount of the cheque, but that of another cheque from Messrs. Hardman for £39 18s. 9d., which he received and gave a receipt for on July 10. These falsifications were made for the purpose of concealing the theft of money from the cash-box; and he was charged with having appropriated three sums of £66 15s., £63 18s. 9d., and £89 10s. 8d. Evidence was then given by Mr. Bell, who detailed the various transactions mentioned by Mr. Brough; and he was cross-examined at great length with the view of showing that there had been laxity in conducting the business of the works. Mr. T. Morris Attlee, Chartered Accountant, of Birmingham, who examined the books, also gave evidence detailing the result of his inspection. Prisoner was committed for trial at the Quarter Sessions.

Longton Corporation Gas Supply.—At the meeting of the Longton Town Council last Thursday, the Gas Committee reported that they had directed that £1500 should be paid over to the borough fund; making altogether a sum of £2000 in relief of the rates paid out of the gas profits for the past year. Mr. A. S. Walters explained that, before taking out the gross profits of the gas-works for the year, the Committee allowed £210 7s. 3d. for depreciation of stoves, and £92 11s. 3d. for bad debts; and there remained a gross profit of £7511 11s. 4d. After deducting interest and sinking fund charges (£5161 14s. 6d.), there was a net profit of £2349 16s. 10d., together with the balance from last year of £79 17s. 10d.; making a total amount of £2429 14s. 6d. The Committee recommended that out of this sum £2000 should be paid to the borough rates, £150 allowed for depreciation of meters, £200 be placed to the reserve fund, and the balance of £79 14s. 9d. be carried forward. It was pointed out that these figures were for the year ended June last, and did not show the result of the working under the mechanical system of stoking since that date. The report was adopted.

MISCELLANEOUS NEWS.

THE GENERAL GAS LIGHTING AND HEATING COMPANY OF BRUSSELS.

The report of the Directors of this Company for the year ending the 31st of August last was presented to the shareholders at the annual general meeting on the 22nd ult. We learn therefrom that the profits realized in the twelve months ending at the above date amounted to 2,584,776 frs. Deducting from this sum the addition made to the sinking fund and other charges, there was a balance of 1,423,033 frs. (£56,921) available for distribution, as compared with 1,304,021 frs. (£52,161) in the preceding year. After payment of the statutory dividend of 25 frs. per share, amounting to 583,875 frs., and making the usual allowances to the Directors and chief officials, a final dividend of 23 frs. was declared; being 48 frs. on each share, or at the rate of 9·6 per cent. per annum—an increase of 50 c. per share. This left a balance of 17,545 frs., which was more than the amount carried forward in the preceding year, and very nearly as much as the balance for 1895-6. A satisfactory feature of the year's work was the extension of the concession of the Carcassonne Gas Company, in which the Brussels Company are shareholders, for 25 years, accompanied by authority to supply electricity. Progress is being made with this matter. In the report for 1896-7, the Directors had to acknowledge that, in consequence of strikes and a high rate of exchange, only indifferent results were obtained at Lisbon. They now have the gratification of recording an improvement in the sales. The Company have a total length of 865,764 metres, or about 952,340 yards, of mains laid; and from them are supplied 23,120 consumers (using 276,153 lights), 15,229 public lamps, 16,879 gas-stoves, and gas-engines furnishing 2372-horse power. The quantity of gas sold in the past financial year was 27,919,016 cubic metres, or about 988 million cubic feet, compared with 27,080,251 cubic metres (956 million cubic feet), in 1896-7.

PUBLIC LIGHTING BY THE INCANDESCENT GAS SYSTEM IN SOUTHWARK.

The Surveyor of the St. Saviour's (Southwark) Board of Works, Mr. G. Roper Norrish, has submitted to the Paving Committee of the Board a long report on the question of public lighting by the incandescent gas system. We learn therefrom that the number of public lamps in the district is 578. This number does not include any supplied by meter, but only those for which the Board pay the South Metropolitan Gas Company a fixed sum—viz., £3 3s. 9d. per annum—which includes gas, lighting, extinguishing, cleaning, and general upkeep, as well as replacing any lanterns or columns that may be broken or damaged. These lamps are each fitted with a 5-feet per hour burner, or 21,000 cubic feet per annum—a public lamp being usually alight for 4200 hours during the year. The 578 lamps cost £1842 per annum, or less a discount of 5 per cent., £1749 10s. The cost of gas for an ordinary street-lamp is £2 7s. 3d., and 16s. 6d. goes for repairs, lighting, &c.; making the total £3 3s. 9d. per lamp per annum. There are in the district 16 meter lamps, the gas for which costs £225 10s. 7d.; the consumption being 1,872,000 cubic feet. The Board have adopted the incandescent system permanently in the case of several of the meter lamps; and Mr. Norrish reports that a great saving in cost has been the result. In one case, a lamp at an important road junction consumed in one quarter 20,000 cubic feet of gas under the old system; but he had it fitted with two globes and four incandescent burners, with the result that there is a much more powerful light, and the consumption of gas for a corresponding quarter to that referred to was 12,400 cubic feet—a saving of 7600 cubic feet. At a refuge, the consumption on the old system (two large burners) was for one quarter 22,900 cubic feet. He substituted two incandescent burners, and the consumption for a corresponding quarter since the alteration was 6700 cubic feet—a saving of more than 16,000 cubic feet of gas for the quarter. In another instance—two lamps on a refuge—Mr. Norrish had one fitted with incandescent gas (two lights), the other being a special burner fixed by the London County Council, who constructed the refuge and handed it over to the Board. For the quarter ending September last, the incandescent burners consumed 6700 cubic feet, and the other burner 15,700 cubic feet of gas. With the consent of the Lighting Committee, Mr. Norrish has made several experiments with the incandescent gas system, in order to ascertain its suitability for general public lighting, whether any improvement in the present system could be made, and whether any saving in cost could be effected. He reports on the matter as follows:—

"The Incandescent Gas-Light Company, who supply the South Metropolitan Gas Company, have just introduced two new burners for street lighting, called respectively No. 2 burner and No. 4 burner. The No. 2 burner consumes 2½ cubic feet of gas per hour, including the bye-pass, and gives a light equal to 50 candles or more. The Company's charge for this lamp would be £2 12s. per annum instead of £3 3s. 9d. for the present lamp, which only gives 13-candle power light with a consumption of double the amount of gas. This effects a saving of 11s. 9d. on each public lamp per annum; and we get a light whose distributing power is four times greater than the present street-lamps. The No. 4 burner consumes 4½ cubic feet of gas per hour, and has an illuminating power of 100 to 120 candles. The annual charge for this lamp, including all repairs, maintenance, &c., would be £3 12s., or 8s. 9d. more than the present charge, but with a light whose distributing power is at least seven times more than our existing lamps. These new burners require no chimney, but would be fitted with anti-vibration coils. Attempts have been made to do without these springs; but in this district they are necessary in many cases, in consequence of the heavy traffic and vibration.

"The question of cost has been considered, and I find a decrease of cost and an increase of illuminating power as compared with my previous report. The cost of fixing the No. 2 burner, before referred to, in our existing lanterns would be 13s. 6d., and an extra 3s. for alterations and adapting the lanterns, or a total of 16s. 6d. per lamp. But if you have new and improved lanterns, which are much to be preferred, the additional cost would be £1 4s., or a total of £2 0s. 6d. per lamp. The No. 4 burner, which gives over 100-candle illuminating power, would cost 17s. 6d. to fit into our present lanterns, and £2 1s. 6d. with a new and improved lantern. The annual cost of this lamp would be £3 12s. The cost of converting the whole of the existing public lamps (578 in number) into incandescent lamps, with No. 2 burners and new reflecting lanterns, would be £1170 9s.; and the cost of gas, lighting, renewals, and all repairs and expenses, £1502 per annum, or less 5 per cent. discount, £1427—a saving of £323 per annum on the present expenditure. The cost of the No. 4 burner would be £2080 16s. per annum, or net £1976 16s.; being an increase on the present cost amounting to £226. The cost of fitting these lamps is 1s. per lamp more than the No. 2 burner."

In view of the Committee considering the question of using both the 50 and the 100 candle power lamps, Mr. Norrish took certain thoroughfares in the district which are wide or have heavy traffic, and would benefit by having a stronger light than the No. 2 burner. In these streets there are 146 lamps; and if fitted with No. 4 burners having a distributing power of 100 candles each they would cost, at £3 12s. per annum, £499 6s. net. The remaining 432 lamps, with No. 2 burners of 50-candle power each, would cost, at £2 12s. per annum, £1067 1s. net; making a total net yearly cost of £1566 7s., as compared with the present net cost of £1750—thereby effecting a saving of about £184 per annum. Mr. Norrish summarizes as follows the net cost per annum:—

Present system	£1750
Estimated cost—	
(1) With No. 2 burner	1427
(2) With No. 2 and No. 4 burners	1566
(3) With No. 4 burner only	1976
Saving on No. 1	£323 per annum.
Do. No. 2	184 „
Increase on No. 3	226 on present cost.

Mr. Norrish points out that he has quoted the Gas Company entirely in the matter of the lighting power of the proposed burners. He states that Mr. Livesey addressed a letter to him on the subject on the 10th of October last, in reply to his inquiries; and he says the Company will not supply incandescent lighting for the ordinary lamps on the meter or average meter system—Camberwell, Limehouse, and Lewisham having tried this experimentally, and given it up, the keeping of so many meters being unsatisfactory, expensive, and unreliable. In compliance with the instructions of the Lighting Committee, Mr. Norrish has fitted the large lamp-column on the London Bridge Approach with incandescent gas apparatus, consisting of three globes with two burners in each; the whole giving a light equal to 600-candle power. This lamp was first tried on Thursday, the 1st ult. The Surveyor says it is highly successful; and, notwithstanding the great increase in light, he hopes to effect by it a saving in the gas bill.

SUFFOCATION BY GAS.

One Death and Two Narrow Escapes—A Police Constable's Intelligent Action.

A good deal of sensational writing has been indulged in by the London Press in reporting a case of accidental suffocation by gas on the Charlton side of Woolwich between Wednesday and Thursday evening last. It is true the circumstances surrounding the matter were of a painful character; but the exaggerated language used in describing the occurrence, the "mystery" with which it was sought to envelop it, to say nothing of the inaccuracies, suggest plainly that it was the work of members of the class of reporters who, possessing the most meagre particulars, draw largely on their imagination with the double object of securing the acceptance of their "copy" by the papers supplied, and lengthening the story to benefit their own pockets to a greater extent than a plain relation of the facts would do. The scene of the accident was No. 480, Woolwich Road, which was occupied by Mr. Edward Willis (a retired licensed victualler), his wife Sarah, and an imbecile son; and the sad occurrence was brought about entirely by inattention to the simple duty of replenishing the water-seal of a chandelier—a neglect which is unfortunately so very general. It was noticed by a neighbour—Mrs. Ann Hender—that the house was closed on Thursday; and had it not been for her acuteness and ready action, the results might have been far more distressing than they were. She informed the police of her impression that something unusual had happened; and, on an entrance being effected, it was found that there had been a considerable escape of gas, and in one of the bedrooms the inmates were discovered in an unconscious condition. Dr. H. L. Bernays was at once summoned; and, on his arrival, he pronounced life in the case of Mrs. Willis to be extinct.

The inquest on the body was held by Mr. E. N. Wood, the Deputy-Coroner for the district, on Saturday, in the Board-room at Charlton Cemetery; and a sketch of the evidence may be given, if only to place on record the intelligent manner in which the police constable who was called behaved in the emergency. Before the witnesses were examined, Mr. J. J. Washington, representing the South Metropolitan Gas Company, expressed his desire to aid the Coroner in any way possible in his investigation. Evidence of identification was first tendered by Mr. Edward Willis (son of the deceased), who mentioned that his mother was 70 years of age. Mrs. Hender then related the part she took in drawing attention to the closed appearance of, and unusual quietness in, her neighbour's house. Following, Police-Constable Pay described how, accompanied by the first witness (who had been sent for), he obtained access into the house on Thursday night, and at once detected a strong odour of gas. He immediately turned off the supply at the meter, and opened the doors and windows in the lower rooms. He then felt his way upstairs; and, on entering the front bedroom, found the smell of gas was very strong. He opened all the windows, in order to allow a current of air to pass through. When he was able to introduce a light into the room, he discovered Mr. and Mrs. Willis and their son in bed all unconscious. He sent for Dr. Bernays, and afterwards assisted him in restoring to animation Mr. Willis and the son. On making an examination he found all the gas-taps turned off. Questioned by the Coroner, he said he had received no special instructions as to what to do in the case of a gas escape of this character, upon which Mr. Wood remarked that the officer

had acted in a very commendable manner. The next witness was William Henry Cupit, a foreman gas-fitter in the employ of the South Metropolitan Gas Company. He stated that, from the tests he made on Friday, he was satisfied that the escape of gas came from the top of the chandelier, in which there was apparently no water. The gas service-pipe and main in front of the house had been examined, and had proved to be thoroughly sound. The Company had nothing whatever to do with the private fittings of the consumers. Dr. Bernays deposed that he first saw deceased about 9.45 on Thursday night; and she was then dead. He had made a post-mortem examination of the body. There were no external marks, the body was well nourished, and the organs healthy. There was some recent congestion of both lungs, and blood and serous fluid on the surface of the brain. The cause of death was serous-apoplexy; and, upon the history of the case, he should say that it was caused by suffocation by gas. He added that both the father and son were, practically speaking, dead on his arrival at the house. He, however, at once set to work on the father, and the police-constable on the son, to restore animation. They had to work several hours. The father was still living, and that was all; but the son recovered rapidly. He could fully endorse what the Coroner had said respecting the conduct of the constable. Mr. Frederick M'Leod, an Inspector of the Gas Company, said he had examined the room in which the chandelier was fixed, and which was situated immediately under the bedroom. The chandelier was connected with a gas-pipe lying between the ceiling and the floor of the bedroom; and there was an aperture in the ceiling through which the connecting-pipe passed, so that gas escaping from the chandelier would have a free passage under the bedroom floor. The Jury returned a verdict of "Accidental death," in accordance with the medical evidence, and desired that a representation should be made to the Commissioners of Police that Police-Constable Pay was highly deserving of commendation.

Suffocations at Belfast and Bury.

A terrible occurrence of a very similar character was last Wednesday reported to the Belfast police. While a butcher named Clements and his wife were attending the wake of a relative on the previous day, their servant, a girl named M'Atavey, and one of Mr. Clements' children, a girl aged 5 years, were asphyxiated in their bedroom; while a young man named Scott, sleeping in an adjoining room, and a younger child were discovered in an unconscious condition. The occurrence became known only at eleven o'clock on Wednesday forenoon, on the return of Mr. and Mrs. Clements, who immediately sent for medical aid. On the arrival of the doctors, it was found that the servant and the girl with her were lifeless; and efforts were therefore directed to restoring Scott and the other child. These were sufficiently successful to allow of the removal of the sufferers—Scott being taken to the Royal Infirmary, and the child to a neighbour's house. The apartment where the deaths occurred has a sloped ceiling, with skylight in the centre, and measures 12 feet by 14 feet, and 7 feet high. The gas-bracket is just above the bed; and it is believed that the servant girl, who had lately come to Belfast from a remote district of County Armagh, blew out the gas (instead of turning it off) on retiring for the night. An inquest was held on the bodies last Thursday, when a verdict of "Accidental death" was returned. Scott and the infant child have recovered.

The Deputy-Coroner for the Bolton district held an inquiry at Bury last Thursday relative to the death of John Lee, a labourer employed at the Bury Gas-Works. Among those present were the Sub-Inspector under the Alkali Act (Mr. Porter), and Her Majesty's Inspector of Factories and Workshops for the Bury district (Mr. C. F. Wright). The deceased, who was 42 years of age, had been employed at the gas-works for 22 years. On the previous Wednesday, he was found near the sulphate of ammonia house, having apparently been suffocated by the fumes. The principal witness called was George Walker, the general foreman at the works. He said that about half-past seven on Wednesday morning a report was made to him that something was wrong with the sulphur-recovery plant, and he told Lee to shut down and have his breakfast and then they would look into the matter. About eight o'clock witness went round again; and, not finding Lee in the sulphate-house, he walked towards the kiln. He came across the deceased about ten yards from the Claus apparatus—his head being on the coke heap. The body was removed, and efforts were made to restore animation; but they failed. A hole had been made in the brickwork, as though the deceased had opened the kiln in the ordinary way. His instructions were that the men were not to interfere with this plant unless he himself was present. There was no danger in opening the kiln, provided the man kept his head away from the hole. A man would not be "gassed" unless he put his head inside, or got directly in the way of the hole. A verdict of "Death from asphyxia" was returned. The Jury further found that the deceased had disobeyed instructions.

The Transfer of the Malvern Link Gas-Works to the District Council.—At a recent special meeting of the Malvern Link District Council, the Clerk (Mr. Foster) was instructed to enter into negotiations with Mr. Moore, the Solicitor to the Malvern Link Gas Company, with regard to the award of the Umpire, amounting to £22,100, in connection with the purchase by the Malvern Council of the Malvern Link Gas-Works. The Clerk last Tuesday reported the result, which was that it was agreed that the Malvern Council should pay the £22,100 into Court and take possession of the gas-works, subject to the appeal lodged by the Malvern Council against the award. This was agreed to, and the Council ordered that a cheque be drawn for the amount.

Hereford and the Welsh Water Scheme for London.—At the last monthly meeting of the Hereford Town Council, the Mayor (Mr. F. R. James) called attention to the London Water Bills, and said it was most urgent that the position of Hereford should be considered. Birmingham had already taken two tributaries of the Wye, and now London proposed to take the head waters; and the Council should see what compensation was to be allowed to Hereford, because they would have no water of their own above the town of Builth. The best salmon spawning-beds in the river would also be done away with. It was agreed that the matter should be referred to the Finance and General Purposes Committee, to report upon what steps should be taken, by way of opposition or otherwise, with regard to the Bills.

MANCHESTER CORPORATION GAS SUPPLY.

Increased Gas Consumption—The Sulphur Question—The Regenerator System.

The consumption of gas in the area of the Manchester Corporation during the last nine months of 1898 was larger than in any similar preceding period in the history of the undertaking. The gas consumed was 3,005,907,000 cubic feet—an increase of 7·56 per cent. over the corresponding period of 1897, and of 19·92 per cent. as compared with 1895. The figures show an average annual increase since 1895 of 6·64 per cent. The quantity of gas sent out from the works is therefore satisfactory enough; but this can scarcely be said in regard to its quality, judging from what transpired at the meeting of the City Council last Wednesday, when Mr. H. Grimshaw asked what steps, if any, the Gas Committee were taking to reduce the abnormally high proportion of sulphur at present found in the gas. Alderman Rushworth said there was no danger of the matter being overlooked. It had had the serious attention of the Gas Committee ever since he had been a member. On the same occasion, Alderman Southern expressed his satisfaction at finding that the Gas Committee had appointed a Special Sub-Committee to inquire into, and report fully on, the question of putting into force the Provisional Order of 1896 authorizing the Corporation to manufacture gas residual products. Alderman Gibson (Chairman of the Gas Committee) said it would be remembered that the Committee, after much inquiry, arrived at the conclusion that it would be economical to adopt a different process of carbonization of coal, and that they decided upon the regenerator process, which had been extremely satisfactory from an economical point of view. He had a few facts to state which he thought would be interesting. The process in question had been adopted at two of the gas-making stations—Rochdale Road and Bradford Road,—and it had been demonstrated beyond question that they had secured from the coal 500 cubic feet more gas per ton. They carbonized at the Rochdale Road works last year 145,533 tons of coal; and as they got 500 cubic feet more gas per ton, it followed that they had a total increase there, through the adoption of this process, of 72,665,000 cubic feet of gas, which, at 2s. 3d. per 1000 feet, meant a gain of £8144. At the Bradford Road works the quantity of coal carbonized last year was 159,038 tons. This gave them 79,569,000 feet more gas, which, at 2s. 3d. per 1000 feet, amounted to £8945. So there was no doubt the process referred to had been very satisfactory from an economical point of view. But, unfortunately, it brought in its train a very considerable increase of sulphur. There was no doubt that the quantity of sulphur in the gas had augmented very materially, and that all that Mr. Grimshaw had said about it was perfectly correct. There was also no doubt that, in the view of the best authorities, and according to the information they could get from the best scientific sources, there was only one mode of purifying the gas from sulphur, and that was by lime. They would, therefore, have to adopt the lime process. There was no question about it whatever. They must get rid of the sulphuretted hydrogen in the best way they could. He thought they would be able to find a market for the lime, and that the Ship Canal would be of use in this respect. The Council, however, might be assured that the Gas Committee would be alert to the requirements of the case. He was pleased to learn that his friend Mr. Alderman Southern was satisfied with the action of the Committee in reference to the manufacture of residual products. The Committee intended to make some inquiries in regard to this matter. They would consider what could be done; but for the present they would probably be content to deal with the ammoniacal liquor.

ROTHERHAM CORPORATION GAS-WORKS EXTENSIONS.

Local Government Board Inquiry.

At the Council Hall, Rotherham, last Thursday, Mr. G. W. Willcocks, one of the Inspectors of the Local Government Board, held an inquiry relative to an application by the Corporation for a Provisional Order to partially amend the Rotherham Corporation Act, 1896, so as to enable the Corporation, with the sanction of the Board, to borrow for the purposes of their gas undertaking such additional money as may be from time to time necessary. Among those present were the Mayor (Mr. F. Mason), the Chairman of the Gas Committee (Mr. G. Gummer), the Consulting Engineer to the Corporation (Mr. G. Winstanley, of Coventry), and the Corporation Gas Engineer (Mr. F. A. Winstanley).

The Town Clerk stated that the population of the borough was estimated at 53,000. The total amount authorized to be borrowed for gas-works purposes up to March 25 last was £140,000; and up to the same period there had been expended £134,883—leaving £5117. They had no power to raise any further money. This £5117 had since been expended in liquidating the balance of the original contracts entered into within the borrowing powers. The Town Council, on the 26th of October last, decided to apply for further powers. In 1896, the Corporation, in a Local Act, obtained sanction to borrow £20,000 for gas-works purposes, to be paid off in forty years. This sum had been expended mainly on a new retort-house. They were asking for an Order to amend this particular section of the Local Act; and he was therefore showing how the £20,000 was spent. The increase in the use of gas had amounted for the past five years to over 6 per cent. per annum; making a total of 30 per cent. for the five years. The Corporation were bound to make extensions; and they called in Mr. Winstanley, of Coventry, who had advised them to the effect that certain works must be immediately carried out to enable the Corporation to supply the gas required. Even with the amount already expended, they had not been able to cope with the demand; and it was necessary that further extensions should be put in hand. Some of these had been partly finished, or were in progress. At the present time, the storage capacity was 1,180,000 cubic feet, which was barely one day's supply. The maximum daily consumption was nearly 1,100,000 cubic feet, leaving a margin of 80,000 cubic feet. This was the quantity they had sent out; but if they could have made more gas, the consumption would have been greater. Besides the borough of Rotherham, the Corporation supplied the area of the Greasbro' Urban Sanitary Authority with about 5000 cubic feet per day; and also a portion of the rural district of Whiston. The population of these areas was about 6000; making the total population within the area of supply about 60,000. In

the year 1897-8, the total receipts of the Gas Department were £33,477; and the expenses (not including the sinking fund and interest) were £24,246. The sinking fund and interest came to £5405; and the profit remaining was £3825, out of which the cost of public lighting (£1565) was paid.

The INSPECTOR: If there was a gas company, you would have to pay them for the public lighting; therefore that is a profit to you.

Mr. Moss (the Borough Comptroller): In the Gas Department, we always show the profit including the public lighting.

The INSPECTOR: The profit is after paying working expenses, sinking fund, and interest. I should call that the profit, because public lighting is a benefit.

Mr. MOSS: In order to be fair to the undertaking, we include the cost of public lighting to begin with. The amount is £1565; and deducting that, the surplus last year was £2260.

The TOWN CLERK said the Corporation were asking for sanction to borrow £40,000, the whole of which was required within twelve months. They asked for the time of repayment to be forty years, the same as already allowed by Parliament. All the money would be borrowed on the security of the whole revenues of the Corporation. The assessable value for borough fund purposes was £164,322; and the balance of the outstanding loans of the borough sanctioned by the Board was £110,122, and under Local Acts of Parliament, £279,255—making a total of £389,377. The assessable value of the borough for district rate was £140,934. Dealing with the details of the £40,000 required, he mentioned that the cost of an additional bench of retorts had been estimated at £4000 when the application was made; but the work had since been tendered for at a cost of £5894. With regard to the enlargement of the mains, it was proposed to pay the cost out of revenue, except £912, as the Consulting Engineer thought the proportion originally proposed allocated too much to capital.

Particulars were then furnished to the Inspector in regard to the cost of the foundations, and the extensions now being carried out; and at the conclusion of the evidence, he visited the gas-works.

TAMPERING WITH GAS-METERS IN BELFAST.

A Lenient Gas Committee.

The Belfast Corporation, at their meeting on Monday last week, had a long discussion on a question affecting the proceedings of the Gas Committee. It arose under the following circumstances: In the Belfast Summons Court, on the 26th of November last, an action brought by the Corporation against one Rogers, a publican of the city, for fraudulently interfering with gas-meters, which had been before the Magistrates on a previous occasion, was again mentioned; and an application was made by the defendant's Solicitor (Alderman Harper) for a further adjournment, on the ground that the matter was to be investigated on the following Friday. The hearing of the case was accordingly postponed till the 12th of December. We do not remember seeing any account of the further proceedings in Court; but probably there was none, as at the meeting of the Corporation on the 2nd inst., the report presented by the Gas Committee contained the following reference to the matter: "The Committee have considered the offer of Mr. M. J. Rogers to pay the loss and damage sustained in respect of the alleged injury to meters, and assessed the amount of loss for gas and repairs at £15; and if he will now pay that sum, and the fine forfeitures of £5 each provided by the Act, the Petty Sessions' Solicitor be instructed to state to the Court that, Mr. Rogers having paid the amount, the Committee do not propose to go further with the proceedings. Alderman Pirrie, dissenting, moved as an amendment, which was seconded by Councillor Anderson—'That, as summonses have been issued, the Committee decline to interfere in the matter.' This was lost—three voting for and five against. The original motion was then put and passed—five voting for and two against. The Cashier reported that Mr. M. J. Rogers had paid over the £40 estimated cost of gas and repairs of meters, and the forfeitures arranged for by the Committee at the last meeting; and the same had been lodged to the credit of the gas fund."

Mr. YOUNG moved the adoption of the report; and the motion was seconded by Mr. DIXON.

Mr. M'INNES, referring to the settlement of the action against Mr. Rogers, said the facts of the case were difficult to deal with, inasmuch as the Gas Committee had prevented the Courts, properly constituted by the law, from dealing with them. It appeared that there were no fewer than six of these cases, and that they did not merely occur in any one of this gentleman's premises. It was discovered at the beginning that there was no consumption on two meters—one in each house; and the Gas Manager thought this was rather singular. The meters were replaced; and the two new ones supplied returned no consumption of gas for a certain period. This also astonished the Manager, who found later that one of the sealed orifices had some wire inserted in it, which interfered with the action of the index. On the 25th of November, the Committee had a meeting, at which the Town Clerk was not present. Mr. Rogers engaged Alderman Harper as his Solicitor (it was scarcely fair that a member of the Corporation should attend the Committee in that capacity); and he said that Rogers placed himself in their hands and at their mercy. Mr. Harper made a good case on behalf of his client. The Committee could not take evidence, and therefore they were not on an equality with the Magistrates.

Mr. YOUNG remarked that the Manager of the gas-works had nothing to do with the proceedings, and that the Committee were entirely responsible for them.

Mr. M'INNES said he was glad to hear that, as it gave him a better opinion of the Committee.

The TOWN CLERK (Sir S. Black) said he ordered the summonses to be issued. The Act under which they were proceeding only required the forfeiture of £5 in each case. The man tendered the £5 and money to cover any loss. They had five forfeitures, £5 to repair the meters, and £10 to cover any possible loss of gas. It was not a criminal offence, and they had no evidence that the man accused had done the damage. He therefore had no hesitation in advising the Committee that they were at liberty to accept the forfeitures.

Mr. M'INNES asked if they were bound to accept monetary penalties in cases of attempted fraud.

The TOWN CLERK replied that, with reference to the particular offence under the Act, they were.

Alderman HARPER said he had no reason to find fault with the bringing of the matter forward. The facts as related by Mr. M'Innes were correct in the main. The accused man had denied that he had committed the offence; but it was explained to him that, as occupier, he was liable, no matter who did it. He (Alderman Harper) suggested that the proper course was to go before the parties who made the complaint against him, and throw himself on their clemency. Would it have been wise for the Corporation to have had four or five civil actions, and four or five of a *quasi*-criminal nature?

Alderman the Right Hon. W. J. PIRRIE felt that a more important subject had never come before the Corporation. If they passed the Committee's report—he regretted that he was a member of the Committee—they would condone an offence. The Town Clerk had told them what penalty had to be paid under the Act of Parliament; but what were Magistrates and the Courts for, except to find out fraud and dishonesty. Until it was mentioned there that this man was a Roman Catholic, he (Alderman Pirrie) knew nothing about it. There was no question of politics or religion. Mr. Stelfox had told them what had occurred in regard to the meters. Why had five meters been taken away? If there was less bolstering up of these things in Committee, the public would not have the opinion they had that day. He was proud to think that during the two years he had sat in the mayoral chair he had not known any instance of the kind. The report referred to "alleged injury." If this were the evidence before the Committee, he agreed with the Town Clerk that the £5 was a sufficient penalty. But the evidence was that, first of all, a meter was taken away, then a second, a third, a fourth; and it was found that the fifth had been tampered with. The previous meters were examined, and the same state of things was discovered. If this were not done intentionally, he did not know the meaning of words. If any Committee of the Corporation could "square" such a matter—that was the term used by one member, at all events—it would teach the public how to get gas without money. By paying a penalty of £5, they could use £100 worth of gas, and then go to the Town Clerk and snap their fingers at the Magistrates. The statement of Rogers was that he believed somebody in his employ was trying to injure him; but that he was willing to pay the Committee rather than have any question about the matter. It appeared, however, from the evidence, that the meters were not in one house where this particular employee might be, but that there were three in one house and two in another. He hoped that, in future, each Committee would try to deal fairly and squarely with the Corporation. He felt it his duty to raise this question that day; and at the Committee meeting he had proposed an amendment. The Town Clerk then told them that if they did not square the matter ——

The TOWN CLERK: I did not use the word "square."

Alderman PIRRIE said one member of the Committee did, and they were led to believe that if they did not hush the matter up the man would lose his licence. He (Alderman Pirrie) would have been willing to withdraw his amendment if he had been satisfied that the incident would be put to the Court clearly as a warning to others. But instead of this, Mr. Lewes, their Solicitor, whom he believed to be a very able man, simply said he thought the summonses were withdrawn—he did not know anything about the matter. Would not this lead one to assume that there was nothing very wrong, and that the public might now go and do likewise?

The TOWN CLERK said the law was that if the meter had not registered, an estimate might be made of the gas consumed, and an amount be charged accordingly.

Mr. TAYLOR thought it would be best, in the interest of the ratepayers and of the Corporation, to let the law take its course in these cases.

Alderman DEMPSEY said if anybody was to blame it was the Committee, and more especially their legal adviser. Perhaps it was through his disposition to deal gently with an oppressed and persecuted race that he was led to deviate from the strict course of law and justice.

The TOWN CLERK: I would give the same advice to-morrow.

Alderman DEMPSEY: I sincerely hope the Committee will not accept it.

Mr. BARKLIE moved, as an amendment, the adoption of the proceedings with the omission of the reference to the case under discussion, and the addition of the words, "and that this Council desires to express strong disapproval of the action of the Gas Committee in interfering with the course of justice."

Mr. TOUGHER seconded the amendment.

After some further remarks,

Mr. YOUNG, in reply, said the matter had afforded a grand opportunity for members of the Corporation to air their eloquence, and show how virtuous and right they were. Alderman Pirrie, to whose strong expressions he particularly objected, coming as they did from a member of the Committee, attended accidentally at that particular meeting, for the first time in about seven months. Previously the matter had been repeatedly reported upon, and Alderman Pirrie, by his absence, had done just as much to "bolster up" the matter as anyone else. The man paid the utmost penny that any Magistrate could have inflicted upon him. If the Corporation wanted to ruin the man by forfeiture of his licence, that was their affair. The Committee got more out of him than the Magistrates could possibly have done, as they were paid for the damage to the meter as well as for the gas. It was not right, in face of the real facts, to say that the question had been hushed up or squared. He thought it would have been far better, from his own point of view, if the man had gone before the Court and pleaded guilty. There would very likely have been a full penalty in the first case, and a nominal sum in the subsequent ones. The proceedings were taken under the Gas-Works Clauses Act, which gave to the Corporation as "undertakers" the right to demand the forfeiture by the offenders of £5 for each offence, and the payment of damages. It being a forfeiture and not a fine, the Committee had been perfectly justified in their action.

The LORD MAYOR (Alderman Sir J. Henderson, J.P.) asked Mr. Barklie to withdraw his amendment.

This having been done,

The LORD MAYOR said he had listened with the greatest interest to the remarks made in regard to this case. It was brought under his notice as Lord Mayor, and he was asked to intercede for the accused man; but he had utterly refused to do anything of the kind. He should like to say that he thought, whenever a matter went so far as to be placed in the hands of the lawyers, a Committee of the Corporation should not interfere.

CARBONIZING DIFFICULTIES AT THE DARLINGTON GAS-WORKS.

At the Meeting of the Darlington Town Council last Thursday, some troubles which have arisen in the carbonizing department were under consideration. First of all, representatives of the men had waited upon the Gas Committee in support of an application for an increase of wages; and the Gas Engineer (Mr. T. Smith) was instructed to obtain information from other towns on the subject. The Committee's minutes included the report of a Sub-Committee in reference to a complaint made by a member of the Council to the effect that, on a certain date in June last, some person or persons connected with the gas-works suggested that, owing to the manner in which the gas had been sent out, the coal was not giving the results which should have been obtained, and that a less quantity of coal should be used. The suggestion was accordingly adopted; and instead of carbonizing 26 tons 8 cwt. in a given number of retorts, 22 tons 8 cwt. were used per day during the stated period. The smaller bulk of coal produced results as good as, if not better than, the larger quantity had done; further, for the purpose of using up the difference between the larger and smaller quantities of coal in the retorts, the stokers were requested to charge an extra retort. The men on the first, second, and third shifts refused to comply with this order. On the last-named shift refusing, the Engineer was communicated with, and he had an interview with the men composing the shift, and asked them if they intended to charge the extra retort. On their giving a distinct negative reply, he ordered the foreman to put the larger quantity of coal—viz., 26 tons 8 cwt.—into the same number of retorts as they were previously using. The Committee, having given due consideration to the above statements, and having had before them the Engineer, Manager, and foremen, expressed themselves satisfied on the following points: (1) That at the time when the smaller quantity of coal was used—viz., in June—the retorts were not yielding as good results as they should have done, and that the reason for their not doing so was that the flues were defective by reason of their being out of repair, and therefore unable to carbonize the larger quantity of coal. (2) That at this time it was not convenient to repair the flues; and it was reasonable to believe that as the larger quantity of coal could not be properly carbonized, the smaller quantity might be dealt with in a more satisfactory manner, and by such means better results be obtained. (3) That the cost of carbonizing the reduced quantity of coal was greater in proportion, by a small sum, than that of carbonizing the larger, on the particular dates in question. The Committee, therefore, felt that the explanation given was in every way satisfactory.

THE REIGATE CORPORATION AND THE LOCAL GAS COMPANIES' UNDERTAKINGS.

The Purchase Project not Abandoned.

It would appear, from what took place at the meeting of the Reigate Town Council on Monday last week, that, notwithstanding the decisive vote of the ratepayers against the gas-works purchase scheme of the Corporation, there is a feeling among some of the members of the Council that the project should be revived. On the above-named occasion, the Mayor (Mr. F. E. Barnes) presented a report on the various steps taken by the Parliamentary Committee in connection with the Gas Bill, and the result of the poll on the matter. Complaints had reached him of "undue interference with voters and their papers, by persons employed by various companies;" and though this, if true, was to be condemned, he thought it would not affect the result of the poll, which he considered had been given against the purchase. The Committee had passed the following resolutions bearing upon the matter: "That this Council disapproves the action of various public companies in the borough for unduly interfering with the voters in the exercise of their powers." "That this Committee decides to recommend the Council to again take the necessary proceedings to acquire the gas undertakings of the borough." "That this Council petition both Houses of Parliament, humbly asking them to reform the existing system of voting in the taking of a poll of the owners and ratepayers, by doing away with the plurality of votes, and taking the vote by ballot, as in municipal elections." "That the Town Clerk send a copy of the resolution and a copy of the petition to other public bodies, asking them to join in supporting the prayer of the petition, and urging them to request their representatives in Parliament to give their aid and support in favour of this much-needed reform in the law, in the best interests of the Municipal Corporations of the United Kingdom." "That the Town Clerk stay all further proceedings with the Reigate and Redhill Gas Bill." The adoption of the report having been moved, Alderman Budgen, referring to the Mayor's addendum as to the alleged complaints in regard to the poll, asked his Worship whether he had received a letter from Messrs. Head, Mole, and Rosling, who had acted for the Gas Companies in the matter, repudiating that any undue influence was used by them on behalf of the Companies. The Mayor replied in the affirmative. He put the addendum to his report in consequence of what came to his knowledge at the counting of the votes and at other times; and thereupon Messrs. Head, Mole, and Rosling wrote to him. Having read their letter, he proceeded to justify his action in writing the addendum, and went on to say, with regard to Messrs. Head, Mole, and Rosling, that, though, no doubt, the firm were in their legal right in acting for the Gas Companies, yet it was a question whether, seeing that they were the Clerks to the Justices, they ought to have taken so active a part in the question. Mr. Viall contended that they had a perfect right to do so. He reminded the Council that if unusual steps had been taken in this matter by the Gas Companies, certainly very unusual methods were adopted on the other side, especially in regard to the extraordinary course of sending out the statement from Messrs. Stevenson and Burstal. He maintained that the result of the poll was definite and clear, and it was one of those cases in which the Council must submit to the will of the people. Mr. Sanders proposed, as an amendment, that the Committee's recommendation to the Council to again take the necessary proceedings to acquire the two undertakings be struck out; urging that, after the recent poll, and the majority of nearly three to one, it was simply treating the burgesses with contempt. Mr. Markham seconded the amendment. Mr. Brackley asked the reason why, on the face of the overwhelming majority against the purchase, the Committee decided to go on again. Alderman Ongley replied that they did not consider the poll had been taken in an honest, fair, and straightforward manner. Mr. Markham pointed out that, in the present state of the law, the Council had nothing to do with the system of voting. His opinion was that the burgesses had not sufficient confidence in the Council to give their sanction to the purchase of the undertakings, and for a good reason. He asked the Town Clerk (Dr. Clair J. Grece) whether it was in order to bring the matter again before the Council when the iron had hardly got cold. Mr. Sanders characterized the proceeding as "cowardly." The Town Clerk replied that he saw nothing irregular in the form of the Committee's resolution. Whether it was discreet or not was, of course, a matter of opinion; and it did not belong to him to express any view upon it. After some further remarks, the Mayor replied. He said it was for the Council to decide whether or not they would back up the Committee in their present resolution. A few mornings previously he met Mr. George Livesey, who asked him whether the Gas Companies had approached the Corporation with a view to settle a Bill and arrange the price of gas. He (the Mayor) replied that they had not, and that the Council had not heard a word from them. Whereupon Mr. Livesey expressed much surprise. If the Corporation had been given the power to promote the Bill, the Companies would have been on their knees to the Council; and instead of the ratepayers paying 6d. or 8d. per 1000 cubic feet more than those of any other borough in Surrey, the price would have been reduced to the same level. The burgesses and property-owners, however, preferred to go on paying an extravagant price. If the Council decided to proceed again, the Companies might still be wise in time, approach the Corporation, and come to terms.

The amendment was then put; and it was lost by a majority of two. Thereupon Mr. Brackley moved, as a further amendment, that the resolution be referred back to the Committee. This was seconded by Mr. Viall. On being put to the vote, the numbers were equal; and the Mayor gave his casting vote against the amendment. Mr. Markham called for the names, with the result that the original resolution was carried by ten votes against nine.

EXTENSION OF THE WHITCHURCH (HANTS) GAS-WORKS.

The enormous development which has been witnessed in the gas industry all over the country during the past quarter of a century has not left unaffected the quiet little town of Whitchurch, in Hampshire; and the consequence has naturally been that the gas-works have become inadequate for the demands upon them. The ground upon which they stand was acquired some forty years ago, at which time there was one small holder, which kept its place till last month. Twenty years later, more land was obtained for extension purposes; and in 1886 an additional holder, larger than the other, was erected. Since then the consumption of gas has increased; Laverstoke, and more recently Overton, having been put in connection. There has consequently been a considerable increase in the capacity of the works. In the first place, the length of the retort-house has been extended some 14 feet, and the number of retorts augmented from 13 to 19; leaving room for further enlargements if required. A new engine and boiler house has been built, of sufficient capacity for two sets of engines and exhausters and two steam boilers; but at present only one engine and exhauster and one boiler have been erected, with the necessary steam-pump. In each case, however, everything is in readiness for the duplicates when they are required. Three new purifiers have been put in, to work in conjunction with one of the old ones retained. A new meter-house has been built, furnished with a new station meter supplied and fixed by the Gas-Meter Company, Limited. A new telescopic gasholder, working in a steel tank, has been erected; its capacity being 34,000 cubic feet, and the tank holding about 119,000 gallons of water. The holder and tank, together with the new purifiers, were supplied and erected by Messrs. Cockey and Sons, Limited, of Frome. A new governor-house has been built and a station governor supplied. The foul main leading to the condenser, as well as the mains on the works, has been increased; and during the past year, 5½ miles of new mains have been laid in the Company's district, further being in contemplation. One of the earliest of the gasholders on the works has been taken down, and its tank converted into a tar-tank. The capacity of the existing scrubber is now being increased; and a new ammoniacal liquor tank is in course of construction. The whole of the new works have been carried out to the plans and under the direction of Mr. W. H. Bale, of the firm of Messrs Bale and Hardy, of Queen Victoria Street, E.C.; the Company's Manager (Mr. W. Docking) being Clerk of the Works. During the past month, the Directors of the Company—viz., Mr. R. Berridge (Chairman), Mr. F. Bridges, and Mr. J. Manwaring—with the Engineer and the Secretary (Mr. W. A. Schultz) paid a visit of inspection to the works, and expressed themselves extremely satisfied with the way the extensions had been carried out; and in order to testify their approval, they arranged that the men should have a social evening at the Company's expense. The builder (Mr. Weeks, of Whitchurch) joined the party, numbering about fifty, who took supper together at the Town Hall. The Manager (Mr. Docking) occupied the chair, and a very enjoyable and successful evening was spent; the principal toast proposed being, "Success to the Gas Company," which was cordially honoured.

Bilston Gas Company.—The annual general meeting of this Company was held on Monday last week—Mr. T. Holcroft in the chair. In moving the adoption of the report, an abstract of which was given in the "JOURNAL" for the 27th ult., the Chairman said there was little to add to what was contained therein. There had been a slight increase in the sale of gas; and he hoped it would be further augmented. The weather was universally mild last winter; and from the point of view of gas shareholders it had not been much better this year. Mr. C. Seager seconded the motion, and said the increase in the sales was largely due to prepayment meters. He was of opinion that if this system were more developed, there would be a still greater increase. The report, which showed a balance of £4264, was adopted; and dividends of 5s. 6d. and 4s. per share (making 11s. and 8s. for the year) were declared.

ELECTRIC LIGHTING NOTES.

The Corporation of Croydon have now completed the taking over of the supply of electricity in Upper Norwood, which is within the area of the borough, but has hitherto been served by the Crystal Palace Electric Supply Company. The transfer has been expeditiously performed; the work having only occupied three weeks. The electricity is generated at the central station at Croydon, and from thence is conveyed to two sub-stations.

We learn from the "Financial News" that at present the capital of Japan—Tokio—has five central electricity supply stations belonging to a private company, and serving 40,000 lamps, besides which there are two concerns for the transmission of electric power. These factories produce about 30,000-horse power, and transmit it at a distance of 55 to 60 kilomètres—roundly, 34 to 37 miles. Similar enterprises exist throughout the country.

It may be remembered that the Imperial Court of Germany decided some time ago that electricity is not a "moveable" in the legal sense. We learn from the "Ironmonger" that, in opposition to this view, the Criminal Court at Elberfeld recently sentenced two men, who had tapped the town electric supply for private purposes, to one day's imprisonment each, holding that this constituted a theft. But for the uncertainty which prevails in regard to the question, the sentence would, it is stated, not have been so light.

The Local Government Board have sanctioned the modified scheme of electric lighting at Bury St. Edmund's, embracing the compulsory area. The lighting will only extend, at the outset, to the central portion of the town, and will be limited to private lighting; the Local Government Board having refused to consent to the original and extended scheme, which would have comprised both public and private lighting for a larger area. The amount of the loan granted is between £15,000 and £16,000, the Board having refused to allow the amount expended in obtaining the Provisional Order, which is about £250.

For some as yet unexplained reason, the Electric Lighting Committee of the Plymouth Town Council have gone back on their previous decision to adopt the Brighton system of charging for current when they begin to supply it. On the recommendation of the Electric Lighting Engineer, it was resolved more than a year ago that the charges should be 8d. per unit for the current supplied to lamps burning one hour a day or less, and 3d. per unit for all current supplied in excess of one hour per day. It is now recommended that a uniform charge of 4½d. per unit be made; and it is explained—somewhat enigmatically—that this uniform charge is based upon an average consumption of three hours per day.

On Saturday, the 31st ult., the undertaking of the Sheffield Electric Light Company was formally transferred to the Corporation, in compliance with the deed of purchase. The Corporation were represented by Mr. R. Styring (Chairman of the newly-formed Electric Light Committee), the Town Clerk, and the City Accountant. The Company were represented by Alderman Franklin (Chairman), Alderman Gamble (a Director), and Mr. W. Johnson (Manager). During the past week, the shareholders were paid at the rate of £17 10s. for each £7 share, with another instalment of about 10s. per share to follow. To meet these payments, the Corporation have borrowed £200,000 from the Bank of England, and the remainder from other sources.

At Thursday's meeting of the Hampstead Vestry, Mr. Farmer complained that while the electric light was being used at St. Mary's Church, the current supplied to the surrounding property in Priory Road was seriously reduced, to the great inconvenience of the consumers. The Engineer replied that a transformer to regulate the current in this particular neighbourhood was on order; and he, of course, laid the blame for the delay on the contractors. This explanation being accepted, Mr. Dyter inquired whether the gas-lamps in Heath Street were to be removed now that the arc lamps have been erected. The Chairman (Mr. Hanhart) explained that the latter had only been turned on that evening, and must be regarded for some time as an experiment, whereupon Mr. Dyter facetiously added, amid some laughter, that his reason for asking was that if the gas-lamps were taken away the ratepayers would lose themselves in the dark.

Mr. A. H. Preece has presented to the Electric Lighting Committee of the Warrington Corporation an important report on the electric lighting of the borough. He recommends as a start, 12,500 lamps, including 20 arc lamps in the streets. The suggested site of the station is that of the old gas-works, where there is space for plant of at least 5000-horse power. The proposed supply will be on the low-pressure three-wire system, which will allow of the current reaching places 1½ miles distant. The cost of the machinery is put down at £16,900; mains, lamps, and connections, at £7700—together, £24,600. In addition, there will be the cost of two refuse destructors and the tipping platform, £3100; and engineering and contingencies, £2300—making a grand total of £30,000. The output is reckoned at 170,000 units—150,000 for ordinary lighting, and 20,000 for the arc lamps. The total expenditure is estimated as follows: Working expenses, £1920; interest and sinking fund, £2000—together £3920. With regard to revenue, assuming that the price at first is 6d. per unit, and the street-lamps are charged at £22 each, the income will be £4190; showing a profit of £270.

The Ilfracombe District Council appear to have some difficulty in deciding what course to take in the matter of the electric light. In the first place, they were approached by an Electric Light Company, who wished to take over the Council's Provisional Order. They then came to the conclusion that it would be a fair and proper thing to give the Gas Company, as a local concern, the option of taking up electric lighting if they cared to do so. At the meeting of the Council last Tuesday, the General Purposes Committee reported that the Gas Company had submitted their terms for supplying electricity. The Company asked for a lease of forty years, with the option to the Council of acquiring the electric undertaking at the end of twenty years. Ten per cent. of the profits were to be paid to the Council. The Committee recommended that the services of an Electrical Engineer be engaged to advise them on the whole subject of electric lighting. A report by the Surveyor was also read, in which he recommended the Council to undertake the work, and not allow any Company to have a monopoly of what must be a profit-producing concern. The Chairman (Mr. H. Braund) said the Committee felt they ought to be advised as to the terms offered by the Gas Company and the Electric Distribution Company, or as to whether or not they should undertake electric lighting themselves. Hence their advice to the Council to call in an expert. Mr. Hooper expressed agreement with the opinion of the Surveyor that the Council should undertake the supply of electric lighting themselves. The recommendation of the Committee was agreed to.

An important scheme for extending the electric light undertaking of the Leeds Corporation came before the City Council last Wednesday, when Alderman Wigram moved that the Council approve acceptance of certain tenders for plant, and that the Lighting Committee be authorized to carry out extensions of sub-stations at an estimated cost of £16,409, and extensions of mains to the Hunslet district at a cost of £8408. The Alderman remarked that this was the first opportunity there had been of giving the Council an estimate regarding the future of the electric light undertaking; and at the best it would be a mere estimate that he should submit. The Committee considered the best course to pursue was to develop the undertaking rapidly but carefully. The items contained in the resolution represented an expenditure of nearly £44,000. The feeling had prevailed that the Corporation had paid a very large sum for the concern. The undertaking was commenced in 1892, and purchased by the Corporation in 1898. The terms of purchase were 5 per cent. annuity on the capital properly expended, which was equivalent to an annual charge of £16,350 for interest and repayment of capital spread over forty years. This was an annual first charge to be met. The city fund would be liable for this if the undertaking did not meet it; but the aim of the Committee would be to keep the fund clear. This made no provision for depreciation. The writer of an able article in the "Statist" pointed out that in all such undertakings depreciation should be calculated at 2½ per cent., which in this case would mean an annual charge of £5500. The extensions were confined to the full development of the existing site; and he believed it would be necessary to expend from £82,000 to £85,000 on the site and on the mains and distributing stations. This would entail for sinking fund and depreciation a further charge of £5000. Without depreciation it would be £3060. This expenditure would be partly reproductive. He did not think the whole of the work could be carried out before Jan. 1, 1901; and the total charge for it would be, with depreciation, about £27,000, and without depreciation £19,500. The existing station allowed of an output of 2400 kilowatts; the engine on order would give 600 kilowatts, and with the proposal for 1200 more there would be a total of 4200 kilowatts. In 1897, the existing station earned £13,054 net. The units sold rose from 833,000 in 1897 to 1,199,000 in 1898—an increase of 43 per cent. The customer was getting part of the revenue. In money, the gross profit was £17,000 in 1897 and £21,600 in 1898, making an increase of 26 per cent. Out of this, he estimated a net profit of £2500; making the earnings £15,500, as compared with £13,000 in 1897. Presuming that in 1899 the increase would be at the same rate, then deducting loss of mill-rent, the increased profit would only be £1000; providing a revenue for that year of £16,554. The year 1900 at the same rate of increase (£2500) would give a total of £19,000 revenue. He believed, however, it would be greater. Thus the account in 1901 would stand: Revenue, £19,054; expenditure, without allowing for depreciation, £19,430. They must, he thought, look to a much faster increase of net earnings; and of this they were practically assured provided that the average price of 4·3d. per unit was not decreased. In conclusion, he appealed to the Council to treat this as they did the gas, water, and tramways—as a great commercial undertaking. He suggested that the Committee should be allowed a free hand, and that the extensions should be completed as a whole, for he believed the undertaking had a wonderful future before it. He hoped they would pull through until 1901 without coming upon the borough fund. It was possible they might not be able to make both ends meet; but he believed that after that date the undertaking would be a paying concern, and that the Corporation would reap the benefit of their present action. Alderman Hannam seconded the motion. Mr. Henry regarded Alderman Wigram's statement as most optimistic. To his mind, 2½ per cent. for depreciation was altogether inadequate. He moved an amendment, omitting acceptance of any particular firm's tender for boilers, and recommending that a contract of not more than £6278 should be entered into. Mr. Kinder seconded the amendment. Mr. C. H. Wilson urged that any sum set apart for depreciation in addition to the sinking fund was a reduction of profits, and was taken out of the pockets of the ratepayers. Alderman Gordon remarked, with regard to the question of depreciation, that if the Corporation did their duty in respect to the renewals, the sinking fund which Parliament forced them to set aside on the top of those renewals was as much as the ratepayers need burden themselves with at the present moment. He believed there was an enormous future for the concern. He suggested that the resolution should be altered to this effect: "That the Council authorize the acceptance of a tender for the supply of four boilers, pipes, &c., for a sum not exceeding £6278." Alderman Wigram accepted the alteration; and Mr. Henry, being satisfied with it, withdrew his amendment.

Gas for Lighting Works.—In a recent report to the Gas Committee of the Stockton Corporation, the Manager (Mr. W. Ford) stated that some of the large works at Thornaby had remodelled their gas lighting arrangements; and, from what he could gather, the success of gas for works lighting had been assured.

The Acquisition of the Market Harborough Gas-Works by the District Council.— At the meeting of the Market Harborough District Council last Tuesday, the Clerk (Mr. G. O. Nicholson) presented a formal agreement between the Council and the Gas Company for the purchase of the works of the latter for £38,000, as and from the 31st of March next. The document was duly sealed and signed.

The Gas Supply in the Metropolis.—Reviewing the past year's progress in gas supply, the "Engineer" says: "Rather more than one-fourth of the total quantity of gas made in the United Kingdom is produced by the three Metropolitan Gas Companies, whose reports for the twelve months ending on June 30 last showed that the amount of gas sold in the Metropolis was nearly 32,613 millions of cubic feet. This is an increase of 939 millions, or 2·96 per cent., on the volume sold in the preceding twelve months. The South Metropolitan Gas Company has again made the best progress; for, charging only 2s. 3d. per 1000 cubic feet, it has sold 5·47 per cent. more gas than in the earlier period. The Gaslight and Coke Company, charging 2s. 10d. and 3s. to the majority of its customers, and the Commercial Gas Company, charging 2s. 6d., can point to increases of only 1·88 and 3·42 per cent. respectively."

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Corporation of Glasgow are nothing if not enterprising. Only five months ago they opened a 2-mile line of tramway, the motive power for which is the electric overhead trolley. Last Thursday, on the recommendation of the Tramways Committee, they resolved to adopt the trolley for the whole of the tramways which they possess. The chief reasons for this haste are that there is to be an exhibition in Glasgow in 1901; and it is considered desirable, in view of the immense development in tramway traffic which may be expected in that year—not to speak of the very rapid growth of the traffic which is being experienced in ordinary times—to have in use a system which will be universal, and therefore interchangeable; and that, unless electricity were agreed upon at once, the Committee would require to proceed to purchase new cars and additional horses. There may, or there may not, be cogency in these reasons. With that I have no concern in these "Notes." But I feel bound to refer to the remarks of Mr. Paton, the Convener of the Committee, in his address in support of the recommendation. He said, surely, ironically, that "nobody could say that the Committee had endeavoured to force the hand of the Council. Manchester, Liverpool, Birkenhead, Leeds, Sheffield, Bristol, Dublin, and Belfast had adopted the trolley. With the single exception of Edinburgh, it was the only kind of traction which was being put to the front in the large towns of this country. Some of his friends in the Council had different ideas. Some, he supposed, thought that the proper motor had not been found, and that the self-acting motor, to be carried by each car independently, was the proper plan to be adopted in working a big tramway concern. Bailie Gray spoke about the gas-motor. He could assure Mr. Gray that the gas-motor was an extinct volcano at the present time. It had been tried in all shapes and forms; and no responsible man, he thought, would now recommend the gas-motor for adoption. It was practically out of date." This decision of the Council is a snatch one, arrived at without internal reasons adduced, as to the best motor. The only reasons stated were the public ones I have given. If gas-motors are not good to-day—as to which the Council had only the word of Mr. Paton—there is nothing to prevent a gas-motor being produced next week which would be more satisfactory than the trolley wire. Yet the Council were rushed into committing themselves to the trolley. I presume that the gas-motor has not been pressed so assiduously upon the Committee as the trolley has been. Be that as it may, it is peculiar that the Tramways Committee, while they gave every facility for the introduction of the trolley, even to the length of experimenting with it, in order to ascertain how it would work in their own hands, have not given the gas-motor the same opportunity of showing what it can do, but have condemned it, as it were, unheard. This is scarcely a fair-minded attitude.

Is there any special reason why complaints as to the illuminating power of gas should be so rife at present? Can it be that this state of matters recurs at intervals, like the spots in the sun? If there is any likelihood of this being the case, the subject is worthy of investigation, because it would be interesting to discover upon what the grumblers exercised their freeborn right before the discovery of gas; and also whether this is one of the afflictions imposed upon the human race by the advance of that element which is glibly spoken of as civilization. Whatever be the reason, it is certain that there has been an outbreak of the malady, of an unusually virulent type, at this season. The first I note has reference to the gas supplied in Edinburgh. It consisted of a letter to a newspaper, written, of course, by an anonymous correspondent. This writer puts the question whether there is a run upon gas on account of the failure of the supply of electric light. He does not confine himself to illuminating power, for he goes on to say that his kettle takes five minutes longer to boil on a bunsen burner, and that the light is like the candles with which they have had to supplement it. No accusation is worthy of being listened to unless it be supported by testimony. This gentleman is not unmindful of this fact, from which, in the spirit of Sherlock Holmes, I am inclined to surmise that he must be a lawyer. He has, he says, heard friends speak of the same thing; so, he concludes, it cannot be the fittings. Unfortunately, he not only withholds his own name, but also fails to condescend upon the number of his friends whom he has heard making complaint, or to give their names and addresses. He thus burkes inquiry at the very start, and prevents Mr. Herring taking any means to ascertain whether there are, or are not, good grounds for making the complaints. But, indeed, it does not seem to be inquiry which he desires. He asks—apparently in the belief that there can be only one answer to his question, and that the word "yes"—"Can it be the new mixture of water gas?" He goes on to ask the readers of the paper what they think; but he does not want everyone to speak at once, for the condition of their giving their thoughts is, "if, like us, they have reason for complaint? Those who are satisfied with the gas supply are to hold their tongue. Thus, if there are ten thousand consumers of gas who are satisfied, and ten who are not, it is required that the ten should have a clear field to make as much dust, or noise, as they can upon the subject; and the vast majority of gas consumers are to stand by and admire the onslaught by the ten valiant ones. Bearing out the principle of anonymity, of course they will all be masked so as to be unrecognizable. The next sentence almost shakes my suspicion that the writer is a lawyer, and makes me think that he is a man who requires to be at his duty by a certain hour in the morning. The letter proceeds: "The morning kettle is the great grievance with us, and we got a new rubber tube last week, so it should be all right." This conclusion, upon the whole, is an expression of his fear that "the Gas Commissioners are taking advantage of the townspeople in this matter." It is not easy to understand why a new rubber tube, being all right, should be expected to improve the heating power of the gas; but, indeed, it is not worth while entering into a consideration of such an abstruse question. This letter is a farrago of nonsense from beginning to end.

The next case I note has reference to the gas supplied to the citizens of Aberdeen. In a meeting of the Town Council this week, Bailie Lyon asked Mr. Johnstone, the Convener of the Gas Committee, "the reason why the gas was so bad at present; it was abominably bad." Mr. Johnstone, surprised at this sudden onslaught, mildly remarked that this was the first time he had heard of such a matter. They had, he said, the report before them; and the return was higher for the past month than for the previous one. A man with a grievance like this would prefer to have a meek confession of guilt, with a promise that the matter would be attended to, and, if necessary, remedied, rather than receive explanations founded upon fact. "I don't care for reports," retorted Bailie Lyon, "the gas is very bad." Now this was a very nasty thing for Bailie Lyon to say. The Gas Manager (Mr. A. Smith) knows his business; and Bailie Lyon does not know it. Mr. Smith proceeds by the best ascertained scientific methods for determining the illuminating power of the gas he supplied; Bailie Lyon simply makes an assertion, without anything to support it. He does not say, in so many words, that Mr. Smith is misleading the Council; but this is an interpretation which his language easily bears, and he deserves to be taken to task for it.

Another instance of complaint has occurred at Cupar, though it was not as to the quality of the gas. Here, again, it was a letter to a newspaper; but the writer was sufficiently honest to give his name. The burden of his complaint was that the Gas Company are paying enormous dividends, and are keeping up the price of gas in order to earn them. He is most effectually disposed of by one of the Directors of the Company, who writes in reply this week, to the effect that the gentleman's gas account is less than 10s. a year, or about 2d. per week; and therefore, he adds, "it would take a chartered accountant to discover how much dividend the Company have derived from him." I suppose that the next time this gentleman writes he will follow the great crowd of grievance-mongers, and withhold his identity. Had he not signed his letter with his own name, the Company would not have been able to set themselves right with the public as they have done. All this shows how unfair it is to attack any individual or undertaking under an assumed name.

I have still another instance of complaint as to quality, from Dundee. In the Town Council, last Thursday, Mr. Speed said that the quality of the gas all over the town seemed to be very inferior, and he should like to know the reason. Mr. Ballingall thought that the quality was very good; the average for the past month having been 24·30 candles. The subject then dropped.

May it not be that there is some real reason for so many complaints cropping up at one time? Can it be the condition of the atmosphere? Verily, for the past month or so the atmosphere has been of the murkiest description. Yesterday it was my fortune to travel from daybreak till night; and I do not think I ever saw a day of such darkness. In more than one town gas was burning in places of business; and its illuminating effect was of the poorest description. Laying aside questions regarding pressure, and the like, I think it is safe to conclude that the sickly nature of the lights was due to the saturation of the air with moisture, by which a haze was produced, affecting the daylight as much as the gaslight. For instance, it was impossible for anyone to read in a railway carriage unless seated by a window. So that, after all, the grumblers may possibly be ignorant of the real cause of poor light rather than indiscreet or mischievous persons.

The question of the cost of acetylene gas is one which is not without interest at the present time. The following authoritative statement, contained in a letter by the Manager of the Acetylene Gas-Generator Company, of Kirkcaldy, which was published in the "Edinburgh Evening News" on the 29th ult., is therefore to be welcomed: "In reference to the paragraph in your issue of Tuesday on 'The Use of Acetylene,' we venture to point out one or two statements, made by a London correspondent, which are not facts: (1) He says that two years ago carbide was £18 to £19 per ton, and that now it can be had for £13. We should be glad to know where we could procure it at that price. Two years ago we paid £28 to £32 per ton; and the cheapest rate at which it can be got in this country is about £18 or £19 per ton. (2) Your correspondent also states that the cost of acetylene gas is 30s. per 1000 cubic feet. In a recent issue of your paper, there was a paragraph regarding an indignation meeting at Cowdenbeath to protest against the price charged by the Gas Company for acetylene gas, which was £5 per 1000 cubic feet. To rectify mistaken ideas as to the real cost of this gas, we give the following data: If carbide is of good quality, 1 cwt. should generate 560 cubic feet of gas; a burner of 25-candle power consuming ½ cubic foot an hour. At £20 per ton for carbide, the cost is therefore 40s. per 1000 cubic feet. This appears a high figure; but the fact has to be taken into account that acetylene gas-burners consume only about ¼ cubic foot per hour, as against 5 cubic feet per hour consumed by coal-gas burners, while giving a more powerful light. Accordingly, 100 cubic feet of acetylene will serve as long as, at least, 1000 cubic feet of coal gas; so that it compares with coal gas at 4s. per 1000 cubic feet, light for light. At this price, for country districts, where the price of coal gas is from 6s. to 8s. it might with advantage be largely made use of. In the interests, however, of the acetylene industry, we wish to make these facts known."

Hythe Water Supply.—The Hythe Town Council have engaged an expert to advise them on the subject of their water supply. It has been pointed out to members of the Council that they were every day losing 6000 gallons of water in consequence of a leak in the reservoir, and a further 8000 gallons have to be pumped from the springs that are at a lower level. It has been decided to have the heading at the Beach Rock reservoir opened, to see whether the water that flowed below the reservoir was due to a leakage or came from an independent source.

The Dorchester Gas-Works Purchase Scheme.—As recorded last week, the above-named scheme was rejected on the poll of the ratepayers by a majority of 424. The number of persons entitled to vote was 1470, and the total number of votes they were entitled to give in the aggregate, on the system of cumulative voting, was 1859; so that 389 additional votes could be recorded owing to the observance of this system of voting. We learn from a local paper that the majority of the cumulative votes, as representing the larger owners and ratepayers, in favour of the proposal. About 200 papers were returned either not filled up or spoilt. The result of the poll more than bore out the rough forecast which had been hazarded, that the figures would be two to one against the proposal, and it emphatically ratified, by the sober and deliberate judgment of the ratepayers, the verdict given at the ratepayers' meeting. The paper alluded to says it is difficult to trace all the causes of the disfavour of the scheme, which developed with the approach of the poll; but the most active was beyond question the inability of the Council to lay before the town the reliable assurances which were reasonably demanded as to its immediate and future effect. Moreover, there was the fear of increasing the burden of the rates.

CURRENT SALES OF GAS PRODUCTS.

LONDON, *Jan.* 7.

Tar Products.—There continues a fair demand for creosote and other coal tar oils. Carbolic acid is also in good request, and maintains its rate. A very large business is being done in pitch; and heavy shipments are taking place, as is usual at this period of the year. There is now very little doubt that the value of pitch will be kept up at any rate until the end of this season. With the continual advances being made in the price of coal and other fuel, it is not unlikely that pitch may command a better price for next season. There is no fresh news in respect to anthracene; but it is felt on all sides that the worst has been seen in connection with this article. Distillers are now taking no trouble to extract it from their tar and oils; and the lessened production is likely soon to make itself felt in the quantity offering. All naphthas are enjoying a steady market; but there is no improvement in prices.

Values are as follows: Tar, 14s. to 19s. 6d. Pitch, east coast, 24s. 6d.; west coast, 22s. Benzols, 90's and 50's, 8d. Toluol, 1s. Solvent naphtha, 1s. 2d. Heavy naphtha, 1s. 2d. Crude, 30 per cent., naphtha, 3¼d. Creosote, 3d. Heavy oils, 50s. Carbolic acid, 60's, 2s. Creosote salts, 35s. Anthracene, nominal, "A," 3⅜d.; "B," 2½d.

Sulphate of Ammonia.—Great firmness characterizes the position; and £10 3s. 9d. to £10 5s., less 3¼ per cent., depending on the facilities for shipment, can be obtained at all ports. The outlook is good; and users of nitrogenous manures are now fully alive to the great value of sulphate as against any competitor. Buyers are eager for forward contracts; and makers are firm in the same relation.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The upward move in prices with the commencement of the present month, amounting to 10d. per ton on the pit, wharf, and delivered rates for all descriptions of fuel in the Manchester district, and 10d. to 1s. per ton in special cases on the pit prices all round in other Lancashire districts, has been practically general in its character; and only in very isolated cases have collieries not followed the advance to the full extent. With this rise in prices, all unexecuted orders at the close of last year were cancelled, except on the condition that customers were prepared to take deliveries at the revised list rates; and judging from the very few notifications that have been received by colliery owners not to deliver orders, the upward move may be regarded as thoroughly and strongly established. The only question of any real concern is with regard to the action of colliery owners in other districts; and this so far seems to be very satisfactory in support of the upward move in Lancashire. In North Staffordshire, there has been a general advance to very much the same extent; and in the Yorkshire district, where prices have perhaps been moving upwards more rapidly than in Lancashire, it is fully anticipated they will be placed on quite the same level as those which colliery owners in this district are now quoting. Derbyshire owners are for the moment hanging back; but there is very little doubt that they will follow. In connection with this strong tone as to prices, we hear reports that gas companies who objected to paying the advance quoted on contracts during the summer of last year, have now to obtain supplies at quite 1s. 6d. per ton above the prices then ruling; and in one case a contract for Arley gas nuts, delivery to commence next July, has been placed at an advance of 2s. 6d. per ton upon the figure which was being paid last July. During the past week, business has been getting back again into its regular course after the holidays; and there has been a fairly large weight put through. House-fire coals are in tolerably active request; steam and forge coals are meeting with a brisk demand; while for engine classes of fuel, with a continued scarcity of supplies, there is quite a pressure to place orders, which are generally considerably in excess of what colliery proprietors are prepared to entertain. At the pit-mouth, in the West Lancashire district, prices may now be quoted at 12s. to 12s. 6d. per ton for best Wigan Arley; 10s. 6d. to 11s., for seconds Arley; 10s. to 10s. 6d., for Pemberton four-feet; 9s. to 9s. 6d., for common house coal; 8s. 6d. to 9s., for steam and forge qualities; 6s. to 6s. 6d., for best slack; 5s. to 5s. 6d., for medium; and 4s. 6d., for common sorts. In the Manchester district, prices average about as follows: Best coals, 12s. 6d. to 13s. 6d. per ton at the pit; seconds, 11s. to 11s. 6d.; steam and forge coals, 9s. 6d. to 10s.; and the better qualities of slack, 6s. to 6s. 6d. In the shipping trade, there is a fairly good business doing, with ordinary steam coals not now quoted under 9s. 6d. to 10s. per ton, and better qualities 10s. 6d., delivered at the ports on the Mersey or the Manchester Ship Canal.

Northern Coal Trade.—There is a strong demand for coal in the North-east; and now that the holiday effects are over, there is a large production, and the deliveries are satisfactory. Best Northumbrian steam coals are firm at about 10s. per ton f.o.b.; second-class steam coals are 9s. 6d.; and steam smalls, about 4s. Manufacturing coals are firm; and contracts over this year are on an average about 7½d. per ton above those for the past year. Gas coal is in good demand; and the shipments are still very heavy. For occasional cargoes of best Durham gas coals, the quotation is about 8s. 6d. per ton f.o.b. A contract for Scandinavia is now in treaty; and the tenders for this will be locked for with curiosity, as showing the drift of the prices likely to rule on the contracts for the year. Gas coke is steady, with little or no change in prices, but with the large output fairly well taken into consumption, as the manufacturing demand is again full.

Scotch Coal Trade.—Business has been in such a condition (owing chiefly to the miners being idle) that quotations are not forthcoming. The coal shipments for the week amounted to 171,662 tons—an increase of 14,424 tons over the previous week, and of 14,738 tons over the corresponding week of last year. During the past year, the total quantity of coal shipped amounted to 9,941,202 tons—an increase over the previous year of 1,693,732 tons. In 1897, the shipments were 8,243,470 tons; in 1896, 7,759,908 tons; in 1895, 7,596,957 tons; in 1894, 5,375,696 tons; in 1893, when there was a four months' strike in the Midlands, 7,927,984 tons; in 1892, 7,689,912 tons; in 1891, 6,758,703 tons. In 1894, there was a strike among the miners of Scotland.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 75.

Issue.	Share	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 13	10½	Alliance & Dublin 10 p. c.	21—22	..	4 15 5
100,000	10	,,	7½	Do. 7 p. c.	16—17	..	4 8 3
800,000	100	Jan. 3	5	Australian 5 p. c. Deb. .	103—105*	+½	4 15 3
200,000	5	Nov. 11	6	Bombay, Ltd. . . .	6¼—6⅝	..	4 8 11
40,000	5	,,	6	Do. New, £4 paid .	4¼—4½	..	5 1 1
380,000	Stk.	Aug. 12	12	Brentford Consolidated	275—280	..	4 5 9
240,000	,,	,,	9	Do. New . . .	210—215	..	4 3 9
50,000	,,	,,	5	Do. 5 p. c. Pref. .	140—145	..	3 9 0
159,375	,,	Dec. 15	4	Do. 4 p. c. Deb. .	128—133	..	3 0 2
220,000	Stk.	Sept. 15	11½	Brighton & Hove Orig. .	263—268	..	4 5 10
226,320	,,	,,	8½	Do. A. Ord. Stk. .	192—196	..	4 6 9
933,500	Stk.	Aug. 31	5	Bristol, 5 p. c. max. .	125—130	..	3 16 11
420,000	20	Sept. 29	10	British	46—47	+½	4 5 1
50,000	10	Aug. 12	11½	Bromley, Ord. 10 p. c. .	26—28	..	4 2 2
75,000	10	,,	8½	Do. 7 p. c. . . .	20—22	..	3 17 3
500,000	10	Oct. 13	6	Buenos Ayres (New) Ltd.	9¼—10	..	6 0 0
220,000	Stk.	Dec. 30	4	Do. 4 p. c. Deb. .	98—100*	..	4 0 0
150,000	20	July 14	8½	Cagliari, Ltd. . . .	29—30	..	5 10 0
100,000	10	Sept. 29	7	Cape Town & Dis., Ltd.	14—15	..	4 13 4
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	57—59	..	5 1 8
550,000	Stk.	Oct 13	13½	Commercial Old Stock .	310—315	..	4 5 9
200,750	,,	,,	10½	Do. New do. .	240—245	..	4 5 9
200,750	,,	Dec. 15	4½	Do. 4½ p.c. Deb. .	145—150	..	3 0 0
800,000	Stk.	Dec. 15	10	Continental Union, Ltd.	200—205	..	4 17 7
200,000	,,	,,	7	Do. 7 p. c. Pref. .	187—192	..	3 12 11
51,600	Stk	Aug. 31	14	Croydon A 10 p. c. . .	305—310	..	4 10 4
168,400	,,	,,	11	Do. B 7 p. c. . .	255—265	..	4 3 0
555,000	Stk.	Aug. 12	5½	Crystal Palace Ord. 5 p c.	125—130	..	4 0 9
60,000	,,	,,	5	Do. 5 p. c. Pref. .	140—145	..	3 9 0
486,090	10	July 28	11	European, Ltd. . . .	23—24	..	4 11 8
354,060	10	,,	11	Do. £7 10s. paid .	17—18	..	4 11 9
14,993,075	Stk.	—	—	Gas- 4 p. c. Ord. . .	116—118	..	—
2,800,000	,,	—	—	light 3½ p. c. max. . .	97—99	..	—
3,799,735	,,	—	—	and 4 p. c. Con. Pref.	124—126	..	—
3,843,975	,,	—	—	Coke 3 p. c. Con. Deb.	99—101	..	—
70,000	10	Nov. 11	8	Hongkong & China, Ltd.	18½—19½	..	5 10 4
3,800,000	Stk.	,,	10	Imperial Continental .	228—235	+1	4 5 10
376,400	100	Aug. 2	4	Do. 4 p. c. Deb. Red.	98—101	..	3 19 3
473,000	Stk.	Aug. 12	3½	Do. 3½ p. c. Deb. ,,	102—105	..	3 6 8
75,000	5	Nov. 30	6	Malta & Medn., Ltd. .	4¾—5¼	..	5 14 3
560,000	100	Oct. 1	5	Met. of 5 p. c. Deb.	110—112	..	4 9 3
250,000	100	,,	4½	Melbourne 4½ p. c. Deb.	105—107	..	4 4 1
541,920	20	Nov. 11	5	Monte Video, Ltd. . .	13—14	..	7 2 10
617,946	Stk.	Aug. 31	9½	Newc'tle & Gatesh'd Con.	232—236	..	4 2 8
252,355	Stk.	Dec. 30	3½	Do. 3½ p. c. Deb. .	112—115*	..	3 0 10
					*Ex div.		

Issue.	Share	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
150,000	5	Nov. 30	8	Oriental, Ltd. . . .	7—7½	..	5 6 8
135,000	5	,,	8	Do. New, £4 10s. pd.	6¼—6⅝	..	5 6 8
15,000	5	,,	8	Do. do. 1879, £1 pd.	1¼—1⅜	..	4 11 5
60,000	5	Sept. 29	7	Ottoman, Ltd. . . .	5—5½	..	6 6 2
500,000	100	Dec. 1	6	People's Gas of Chicago Bonds.	102—106	..	5 13 2
848,070	10	Oct. 13	6	River Plate Ord.. . .	9—9½	..	6 6 4
250,000	Stk.	Dec. 30	4	Do. 4 p. c. Deb. .	98—100*	..	4 0 0
250,000	10	Sept. 29	10	San Paulo, Ltd. . . .	15½—16½	+¾	6 1 3
135,000	Stk.	Sept. 15	10	Sheffield A.	242—245	..	4 1 8
209,053	,,	,,	10	Do. B.	242—245	..	4 1 8
447,427	,,	,,	10	Do. C.	242—245	..	4 1 8
5,600,000	Stk.	Aug. 12	5½	South Metrop., 4 p.c. Ord.	137—140	+1	3 16 1
1,460,000	,,	July 14	3	Do. 3 p. c. Deb. . .	102—105	..	2 17 2
60,000	Stk.	Aug. 31	12	Tottenham and A. .	280—290	..	4 2 9
60,000	,,	,,	9	Edmonton B. .	200—210	..	4 5 9
182,380	10	Dec. 30	5	Tuscan, Ltd.	9½—10½*	..	4 15 3
149,900	10	Jan. 3	5	Do. 5 p.c. Deb. Red.	99—101*	+1	4 19 0
				WATER COMPANIES.			
746,184	Stk.	Dec. 30	11	Chelsea, Ord.	310—315*	..	3 9 10
150,000	,,	,,	5	Do. 5 p. c. Pref. .	168—173*	..	2 17 10
160,000	,,	,,	4½	Do. 4½ p. c. Pref. '75	147—150*	..	3 0 0
175,785	,,	Sept. 29	4½	Do. 4½ p. c. Deb. .	157—162	..	2 15 7
1,720,560	Stk.	Oct. 13	7	East London, Ord. . .	212—217	+2	3 4 6
654,740	,,	Dec. 30	4½	Do. 4½ p. c. Deb. .	157—160*	..	2 16 3
390,000	,,	,,	3	Do. 3 p. c. Deb. .	101—103*	..	2 18 3
700,000	50	Dec. 15	7½	Grand 10 p. c. max. .	108—113	−2	3 6 4
310,000	Stk.	Sept. 29	4	Junction 4 p. c. Deb. .	138—143	..	2 15 11
708,000	Stk.	Aug. 12	14	Kent	365—370	..	3 15 8
160,000	,,	,,	7	Do. New, 7 p. c. max. .	212—217	..	3 4 6
1,043,800	100	Dec. 30	10½	Lambeth, 10 p. c. max. .	295—300*	..	3 10 0
406,200	100	,,	8	Do. 7½ p. c. max. .	225—230*	..	3 9 7
350,000	Stk.	Sept. 29	4	Do. 4 p. c. Deb. .	138—143	..	2 15 11
500,000	100	Aug. 12	12½	New River, New Shares	432—437	..	3 0 8
1,000,000	Stk.	July 28	4	Do. 4 p. c. Deb. .	138—143	..	2 15 11
902,300	Stk.	June 29	7½	South- Ord. . . .	185—190	+1	3 18 11
126,500	100	,,	7½	wark 7½ p. c. max. .	170—175	..	4 5 9
489,200	Stk.	,,	5	and 5 p. c. Pref.	168—171	..	2 18 6
1,019,585	,,	Oct 13	4	Vauxhall 4 p. c. A Deb.	138—143	..	2 15 11
1,155,066	Stk.	Dec. 15	10	West Middlesex . . .	293—218	+3	3 7 1
200,000	,,	,,	4½	Do. 4½ p. c. Deb. .	160—163	..	2 15 3
200,000	,,	Sept. 15	3	Do. 3 p. c. Deb. .	102—105	..	2 17 2
					* Ex div.		

Taibach in Darkness.—On New Year's Day, an accidental interruption occurred in the supply of gas from the Aberavon Corporation Gas-Works, and as the result the streets of Taibach were in darkness during the night, and public worship had to be conducted under somewhat unusual conditions.

Improvements at the Leeds Gas-Works.—New boilers and mains have recently been put down at the York Street gas-works, Leeds. The old boilers were too small and rather unreliable; while the old mains were becoming clogged up. The new boilers, which are of the Lancashire type, are 25 feet long and 7 feet in diameter, and work at a pressure of 100 lbs. per square inch. Each of them is equal in power to the pair which they replace, and which had to be kept going continuously. The new mains are 24 inches in diameter, as compared with 18 inches, the size of the old ones. Until now the works have been dependent upon the city mains for water to feed the boilers; and in the event of the supply being shut off or the pressure being low, considerable difficulty was experienced in keeping them working. To prevent such experiences in the future, an iron tank has been erected over the boiler-house. It is about 35 feet long, 20 feet broad, and 6 feet deep. In the near future, the York Street Works Committee will have to consider the question of introducing some new system of stoking. The matter will not be an easy one to decide, as the premises are not well adapted for machinery or inclined retorts, such as are in operation at the Meadow Lane and New Wortley works.

The "Financial News" on the Workmen's Compensation Act.—Glancing at the chief events of interest in the insurance world during the past year, the "Financial News" made the following remarks on the Workmen's Compensation Act: "Seeing that the Workmen's Compensation Act only came into force a few months ago, it is impossible yet to form any definite conclusions as to the quality of the business which has been undertaken; but there can be no doubt that the quantity has been enormous. Offices which had previously undertaken accident business increased their capital in preparation for coping with the expected rush; many new companies were formed; and several old-established life offices were induced to form accident branches. In the severe competition which ensued, rates were quoted which were positively astounding in their diverseness. A few years are required to show whether the conservative offices, or those which accepted risks for what seemed utterly inadequate premiums, were right. One important step was taken by some of the older and wealthier offices—they combined for the purpose of insuring 'catastrophe risks.' Many knotty legal points have been raised by the Act; but very few of them have yet been definitely decided. One very important question which has so far been decided against the companies is whether liability policies shall bear a penny or a ten shilling stamp. A ten shilling stamp duty is, however, so obviously unfair that, even if the final legal decision is against the companies, they have every chance of carrying their point. With regard to the effect of the provisions of the Act on relations between workmen and employers, there are several statements about to the effect that certain employers have decided to employ no more old or married men; but they lack definiteness. There is, however, no inherent improbability of such a development."

The Assessment of the Carnarvon Water and Gas Works.—At the meeting of the Carnarvon Town Council last Tuesday, it was reported that the Assessment Committee of the Carnarvon Union had refused to listen to the representations of the Finance Committee against the assessment of the water and gas works. The Committee therefore recommended that the balance properly due of the poor-rate be paid under protest, and that the Committee be vested with full power to take steps to appeal in Quarter Sessions. This was agreed to.

The Public Lighting of Newcastle.—At the last meeting of the City Lighting Committee of the Newcastle Corporation, the estimates for street lighting for the year were presented and adopted. According to these, the cost for lighting the public thoroughfares by means of gas will be £11,419 12s. 11d., less 17½ per cent., amounting to £1998 8s. 9d., and a rebate for lamps reported brings the cost down to £9381 4s.; cost of maintenance, £5472 0s. 4d.; cost of electric lighting, 24 arc lamps, at £42 each, £1008. These added to other necessary expenses will cause the total estimates to be £16,299 4s. 6d. The estimate for 1897 was £14,484 4s. 2d., and for last year £15,126 5s. 11d. The number of gas-lamps last year was 5977; this year it will be 6127. It was pointed out that the increase of the estimates was caused mainly by the advance of 2d. per 1000 cubic feet in the price of gas.

The Public Lighting of Canterbury.—At the meeting of the Canterbury Town Council last Wednesday, the Town Clerk reported that the contract with the Gas Company expired on Dec. 31, 1898. The Council would remember that he was instructed to get the Company to agree to a contract for a half year instead of a year, because in March the Council would be in a position to light the city with electricity. He also asked the Company to do away with the clause providing that if the Council only wanted half the number of lamps they had had they would have to pay for the whole number, though only a portion were used in the middle of the year. The Company refused to agree to this; and the matter was left in his hands. He informed the Company that, as the Council were going to have the electric light, it did not seem fair to ask them to enter into a contract on the ordinary terms; and the Secretary wrote agreeing to some extent to the Town Clerk's suggestion. Two or three new clauses were inserted in the contract, but he (the Town Clerk) struck off one which stated that the Company should charge £3 10s. per annum for every lamp, and wanted to base the charge upon the present number of lamps. He suggested that there was some ulterior motive in this clause being inserted, and that when the contract came to an end the Council would have to pay £3 10s. on 400 lamps, which was more than the Company could properly charge, for the Act of Parliament specified that the basis of price should be the same as that charged to private consumers. The Company also wished the number of lamps not to be reduced until the end of the contract next June. He advised the Council to agree to the contract as put before them by the Company, excepting as to the £3 10s. per lamp basis. Some discussion ensued; and it was eventually decided to accept the contract, providing the basis of price was struck out, and to pay for the gas upon such terms as an arbitrator should determine.

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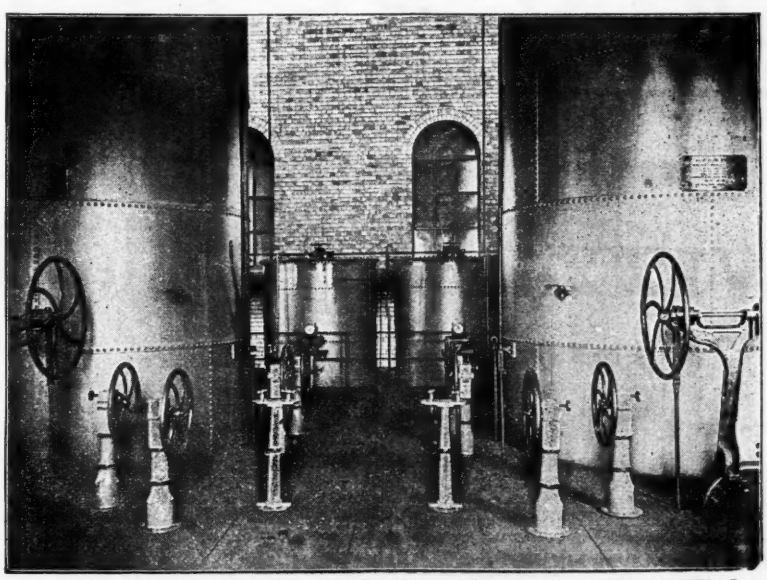

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Working Floor of Generator House. One Quarter Section of Birmingham Plant, Windsor Street Station.
The Maximum Daily Capacity of the Birmingham Corporation's Plant, which was erected by this Company, is 10 MILLION CUBIC FEET.

New Water-Works at Faversham.—The Faversham Water Company are about to make some important extensions at their works. The scheme comprises two reservoirs of a capacity of 500,000 gallons each; sinking three wells 20 feet deep, and furnishing them with the necessary pumping machinery; and the running of an additional 1000 feet of adits. The plans and specifications for this work are being prepared by Mr. W. Lindley Catlin, the Company's Engineer and Manager.

The Transfer of the Todmorden Water-Works to the Rochdale Corporation was formally completed on the 31st ult., though the Corporation have been practically in possession of the undertaking since the passing of the Act of last session. The Directors of the Todmorden Water Company met at the office of their Solicitor (Mr. Craven), the Town Clerk of Rochdale (Mr. J. Leach); and the conveyance of the property was then signed and handed over to the latter.

The Purchase of the Torquay Watershed.—Mr. E. P. Squarey, the Umpire in the recent arbitrations in connection with the purchase of the land forming the watershed of the Torquay Corporation Water-Works, has made his award. Mr. Appleton, the Chairman of the Water Committee, stated at the Town Council meeting last Tuesday that the total amount claimed was £37,345, and the award did not amount to this by more than £9000. The amounts as published do not correspond with these figures, and apparently are incomplete. They are as follows: G. Wills (part of Moor Barton, Didworthy, and part of Pepperdon), claim, including water rights, £21,000; offered by Corporation, £10,000; awarded, £14,722. Trustees of the late Mr. W. Addems, Clampitt Farm, claim, £5600; offered, £3300; awarded, £5195. Trustees of the late Mr. Thomas Loveys, Kennick Farm, claim, £5000; offered, £3300; awarded, £4260. Trustees of the late Mr. T. Hannaford, Bullaton Farm, claim, £3006; offered, £1750; awarded, £2400. Mr. W. Easton, Lower Westcott Farm, claim, £811; offered, £370; awarded, £627. Mr. N. Addems, Middle Westcott Farm, claim, £800; offered, £230; awarded, £375.

Warrington Water Supply.—A meeting of the Warrington Town Council was held last Tuesday, at the Town Hall, to consider a Bill to be promoted next session for the construction of additional water-works and the improvement of the borough. Mr. Lee, the Deputy-Chairman of the Water Committee, explained that since the water-works had been in the hands of the Corporation the population had greatly increased. In 1894 only 74½ million gallons of Appleton water were consumed; but during the past year, 100 million gallons had been supplied. There was not now ample storage accommodation. The scheme, which they would not be compelled to carry out in its entirety unless thought desirable would cost about £282,000; and their Water Engineer (Mr. J. Deas) had assured them that, with judicious management, it could be done without burdening the rates at all, as the income would cover the expense. In fact, next year they could spend £50,000 without touching the reserve fund. During the discussion which followed, Messrs. Bennett and Smethurst expressed the opinion that the Council were launching out into large schemes of expenditure, and that something less elaborate should, if possible, be found. The proposal was, however, finally agreed to unanimously.

New Joint-Stock Companies.—The Church Stretton Gas Company, Limited, has been registered with a capital of £5000, in £10 shares, to acquire and conduct the business of gas manufacturers and suppliers carried on at Church Stretton, Salop, under the style of David Hyslop and Co. The Wootton District Water Company, Limited, with a capital of £1000, in £1 shares, will supply water to the inhabitants of the district of Wootton, in the Isle of Wight.

Sheffield and the Derbyshire Water Schemes.—The ratepayers of Sheffield, at a public meeting held last Friday, authorized the Corporation to promote a Bill in Parliament for acquiring a water supply from the Derwent Valley, at a cost of over two millions, apart from the similar Bills being promoted by the Corporations of Leicester and Derby, at an estimated expenditure respectively of four-and-a-quarter millions and seven millions. All efforts to arrive at an amicable understanding have failed. Sheffield recognizes the right of Derby and some parts of Derbyshire to a fair share of the Derwent Valley waters, but denies the right of Leicester to take a supply.

The Gift of Water-Works to a Yorkshire Village.—The Pickering Rural District Council had under consideration on Monday last week, a letter from Mr. J. Gill, of Clairville, Manchester, the owner of the Sutherland Lodge Estate, Cropson, confirming his offer to pay the cost of a scheme of water supply for the village. The question of providing water had frequently been before the Council in recent years; and the last move was to engage an engineer to furnish a scheme. The plans were sent to the Local Government Board for approval; it being the intention of the Council to apply for borrowing powers to carry out the undertaking. Mr. Gill now offered to pay the sum estimated (£1500) into the bank to the credit of the Council, in order that there might be no further delay in getting to work; the Council at the same time to undertake the control and future maintenance of the water-works. The Council passed a vote of thanks to Mr. Gill for his generous offer, and instructed the Clerk to advertise at once for tenders for carrying out the scheme.

Increased Capital Powers Proposed for the Wigan Gas-Works.—At the monthly meeting of the Wigan County Borough Council last Wednesday, the Chairman of the Gas Committee (Mr. Alderman Holmes) brought forward a motion to the effect that application be made to the Local Government Board for sanction to the borrowing by the borough, of the sum of £19,626 10s. 2d., for the purposes of the gas undertaking. Mr. Fyans wanted to know at what rate they were increasing their capital debt in connection with the gas-works, and at what rate they were diminishing it. Alderman Holmes could not give a direct reply, but said that in 1892 the Gas Committee applied for powers to borrow £40,000, which was not all expended yet—there was £9724 still unspent. They were overspent in that year about £3000; so that since 1892 they had spent £27,000 on gas capital account. Opposition to the proposal being threatened, the Mayor said there would be a public inquiry held by a Government Inspector, when any member of the Council or ratepayer could make inquiries and object to anything if necessary. The motion was eventually passed; Mr. Fyans alone dissenting.

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See pp. IV. and V. centre of "JOURNAL."

The Gainsborough District Council and the Gas-Works.—The polling of Gainsborough on the question whether or not the town shall acquire the gas undertaking was concluded on Friday, the 6th inst., and for the purchase, 1440 voted; against it, 433; majority for, 1007. The number voting was 1559. There were 553 blank papers, 40 were unsigned, and 50 were bad.

A New Coal Trust.—According to the "Pall Mall Gazette," among the great trading combinations promised in the Spring, with a view of raising prices by checking competition, is an amalgamation of the leading coalowners. The preliminaries of this scheme have been agreed upon; and gas and railway companies who are not protected by long contracts will have to look to their pockets.

Public Lighting in Plymouth.—The Electric Lighting Committee of the Plymouth Corporation, who are to have control of the public lighting of the town in future, have decided to suggest to the Gas Company that the arrangement for handing over to the Corporation the lighting and maintenance of the public lamps shall be carried out on the 31st of March. A new schedule of hours for lighting and extinguishing the lamps is to be submitted to the Gas Company. Pending the completion of the arrangement for the lighting and maintenance of the lamps, it has been decided not to increase their present number; and consideration of the question of lighting with gas the district of Laira—now temporarily lighted with oil—is postponed to the same time.

The Fixing of a Prepayment Meter Followed by a Gas Explosion.—A gas explosion occurred last Saturday night at 1a, Ingoldisthorpe Grove, Camberwell, in a seven-roomed house tenanted by two families named Richardson and Hughes. A penny-in-the-slot gas-meter had been fitted in the premises during the evening; and an escape of gas was subsequently detected. About a quarter-past seven, a loud explosion took place, which was immediately followed by a crash of glass, and a burst of flames from the front windows. Firemen arrived a few minutes afterwards, and succeeded in extinguishing the fire. The inmates of the house had, meanwhile, escaped injury. The scene of wreckage was an extraordinary one. Furniture was shattered and blown in all directions, the window-frames were forced out, and the entire premises were in a state of chaos.

The Staines Reservoirs Scheme.—The Staines Reservoirs Joint Committee have paid into Court the sum of £19,250 as the purchase-money of the land on which the sewage of the town of Staines is at present being treated. The land has been acquired in order to avoid any objection that might be raised by reason of a sewage farm being in proximity to one portion of the reservoir works. The Staines District Council have purchased another site at some considerable distance away; and they are under agreement to give up the land at present in use within nine months of the payment of the purchase-money into Court. Though work was only started by the Contractors (Messrs. John Aird and Sons) last May, great headway has been made; and some 2000 men have been regularly employed during the last few months. It is expected, however, that in the future there will be as many as 3000 or 4000 men engaged.

Another Record Delivery of Gas.—In last week's issue, it was mentioned that Manchester and Oldham attained their record day's output of gas on the 21st ult., which was the shortest and darkest day of the year. We now learn that the Commercial Gas Company registered their largest send-out on the following day; the quantity being 12,528,000 cubic feet, which exceeded by 120,000 cubic feet the previous day's output.

Sales of Shares.—Last Wednesday, Mr. J. C. Towner sold some original and "C" shares in the Eastbourne Gas Company at prices ranging from £35 10s. to £36 7s. 6d.; "B" shares fetching from £25 15s. to £25 17s. 6d. On the same day, Mr. H. Jones sold some original £10 (10 per cent.) shares in the Hyde Gas Company at £26 and £26 1s. each; new (7 per cent.) shares being purchased for £18 17s. 6d. and £18 18s. 6d. apiece.

The Charge for Gas in London.—The Joint Committee of the Clerkenwell, St. Luke's, and Holborn Vestries have convened a conference, to be held at the Holborn Town Hall on the 18th inst., on the subject of the steps to be taken in reference to the proposed parliamentary inquiry into the charges of The Gaslight and Coke Company, a Committee for which purpose was constituted last session. All the Vestries and District Boards of North London have been invited to send delegates.

Another Gasholder Accident in America.—The truth of the adage that "misfortunes never come singly" has just been exemplified by an accident to another gasholder in America—this time at the works of the Poughkeepsie (N.Y.) Gas Company. On the afternoon of the 16th ult., an explosion occurred in the purifier-house; resulting in the loss of three lives, the temporary wrecking of the Company's largest holder, and damage to property in the neighbourhood. According to the "American Gaslight Journal," the accident was caused through the carelessness of one of the responsible workmen, who neglected to attend to the valves at the change from the day to the night shift; and he paid for his inattention with his life. Fortunately the Company were able to send out gas 24 hours after the explosion.

Dangers of Overhead Electric Wires.—An incident occurred in Dublin last Friday, which has aroused considerable anxiety in the city as to the dangers of overhead electric wires, which are rapidly being introduced for street traction. In Cavendish Row, according to the "Daily News," a guard wire over the ordinary trolley wire snapped, and falling across the electric wire, carried the current to the ground, into which it passed in a continuous vivid discharge, causing great consternation among the people walking through the thoroughfare. A crowd soon collected round the place, and near where the broken wire lay a car-man drew up his horse and car. Suddenly the animal, having apparently been affected by the current of electricity, toppled over, upsetting the car in its fall, and almost at the same time a horse passing with a milk-van displayed in a similar manner evidence that it also had been influenced. Another horse, frightened by the electric flashes, bolted at a furious pace down O'Connell Street. Naturally these occurrences greatly increased the alarm of the people, who were afraid to approach either of the horses, both of which, however, were ultimately dragged by the reins away from the vicinity of the broken wire.

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WINTER SEASON 1898-9.

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New Season's Lists on application.

The Leeds Fire-Clay Company, Limited, have been entrusted with the order for six through settings of eight retorts each, on their shallow regenerative principle, by the York United Gas Company.

It has been announced in New York that an International Air Power Company, with a capital of $7,000,000, has been organized to supply London and other European cities with street vehicles propelled by compressed air.

The Gas Committee of the Stockton Town Council have accepted the tender of Messrs. Thomas Allan and Sons for the supply of gas-pipes for the ensuing year, at the following prices: 3-inch, £5 7s. 6d. per ton; 4-inch, £5 3s. 6d. per ton; 5 and 6 inch, £5 1s. 6d. per ton; tees and bends, 9s. per cwt.

According to the "Chemical Trade Journal," the contract for the tar produced at the Gaythorn Gas-Works, Manchester, has been let on a sliding-scale for one year from the 1st of March next, at 7s. 9d. per ton; the other prices offered being 7s. 10½d., 8s. 10d., 9s., and 10s. The prices include only the cost of working and the carriage of the tar to the distiller's premises.

"Gas and How to Use It" is the title of a well-printed booklet prepared by Mr. J. H. Troughton, the Manager and Secretary of the Newmarket Gas Company. It contains so much information, especially in regard to incandescent burners as compared with electric light, valuable to consumers, that they would do well to follow the advice given to them on the cover, and keep it for future reference. It is corded at the corner to allow of it being hung up.

The production of coke in the United States in 1897 amounted to 13,288,984 tons, as compared with 11,788,773 tons in 1896. The largest production was effected in the State of New York—viz., 8,966,924 tons in 1897, and 7,356,502 tons in 1896. West Virginia ranks second, with a production of 1,472,666 tons in 1897, and 1,649,755 tons in 1896. Alabama came third, with an output of 1,443,017 tons in 1897, and 1,479,437 tons in 1896.

The Gas-Meter Testing Committee of the Manchester Corporation report that the number of meters tested during the past year was the highest on record—recent instructions of the Corporation Gas Committee providing that all meters used by them must be tested by the department. The number of meters tested during the year was 31,747, as compared with 25,862 in the preceding year; and the fees charged amounted to £946, as against £805 in 1897.

Testimony to the excellent way in which the Thirlmere Water-Works of the Manchester Corporation have been carried out was afforded at the meeting of the City Council last Wednesday, when Sir John Harwood, speaking in reference to some inconvenience arising in one or two parts of the city from a slight accident at the works, pointed out that, although there were 28,000 pipes on the aqueduct, only seven of them had burst during the inaugural stages of the undertaking.

The "Board of Trade Journal" for December states that not many months ago, the British Consul at Amsterdam reported that a large order for water-pipes had been placed in Belgium, instead of in England, simply because the English makers would not comply with the specification, which was based on the metric system. It also states that the Committee on Coinage, Weights, and Measures of the United States have unanimously reported in favour of the system being adopted on Jan. 1, 1901.

In connection with the extension of their reservoirs on the banks of the Thames at West Molesey, the Lambeth Water Company are erecting a brick wall which the Molesey District Council allege will destroy the beauty of the scenery there; and they asked the Company to plant a row of trees along the bank. At the meeting of the Council last Tuesday, a letter was read from the Company, in which they stated that the wall, which was of ornamental appearance, designed with piers and panels, would be scarcely, if at all, visible from the river. A sloping bank would be erected above it, and, when it was finished, the river view would be as pleasing as before.

In the "Journal" for the 6th ult., we noticed that Messrs. Crossley Bros., Limited, of Manchester, had received from the London County Council an important order for gas-engines. We learn that this is the largest installation of the kind in the country, and possibly in the world. It consists of eight double-cylinder horizontal gas-engines, four giving a maximum indicated horse power of 260 each, and four of 210 indicated horse power each; also four engines of 5 indicated horse power, combined with air-compressors and hydraulic pumps. The eight large engines are to be built on Messrs. Crossley's well-known "tandem" principle, and all are to work with coal gas. As previously mentioned, they are to be used for driving centrifugal pumps at the Lots Road sewage-pumping station. This is the second order for pumping-engines which the firm have received from the Council.

As many of our readers are doubtless aware, the first number of the "Builder" each year is selected by the proprietors as the vehicle for presenting to the subscribers a largely increased number of the excellent plates by which the letterpress is accompanied week by week. This year they seem to have surpassed all previous efforts in this direction—at all events in point of numbers. There are no less than twelve double-page plates, seven of them illustrating Dublin architecture, in connection with a series of articles on "The Architecture of Our Large Provincial Towns," of which the 22nd appears in the current number. There is an interesting four-page plate showing a half-century's change in London, being two views taken from the same spot on Waterloo Bridge in 1848 and 1898; a folding plate shows Sir A. Binnie's new Vauxhall Bridge; and there is an exceedingly well-printed map of the County of London, showing by red lines the boundaries of the surveyors' districts under the Building Act, taken by permission from the official map of the London County Council, and giving the names and addresses of the District Surveyors. The general contents are of the usual interest to professional men; while the chapters on "Architectural Hygiene" commenced in the "Student's Column" cannot fail to be helpful to those who are seeking information on this important subject. The number which commences the 57th year of the "Builder's" existence contains abundant evidence of a determination to keep it in the position it has so long and so worthily occupied.

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Telegrams: "HUTCHINSON BROS., BARNSLEY."

SULPHURIC ACID for Sale.
BROTHERTON AND Co., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

NEW GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

GAS TAR wanted.
BROTHERTON AND Co., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND Co., Ammonia Distillers Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

SADLER & CO., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.
Correspondence invited.
Telegraphic Address: "SADLER, MIDDLESBROUGH."

IMPORTANT.

REPAIR your old Retorts with Patent STICKFAST FIRE CEMENT. Unequalled for Repairing Inclines. Estimates for all kinds of Retort-Settings.
Write CROWTHER, Retort Setter, and Sole Maker of Stickfast Fire Cement, Manor Street, HUDDERSFIELD.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E., and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

ECONOMY IN PURIFICATION.

INCREASE the efficiency of your PURIFIERS by adopting CRIPPS'S PATENT BYE-PASS VALVE in the lower Tiers of Sieves. Practical Experience proves their Economy. Engineers are repeating orders after thorough trial.
References and Particulars can be obtained from the Makers—
C. & W. WALKER, Midland Iron-Works, Donnington, near Newport, SALOP.

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

SPENT OXIDE wanted.
BROTHERTON AND Co., Chemical Manufacturers Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."
[For Illustrated Advertisement, see Jan. 3, p. 10.]

WANTED, Carbon in 4 Ton Lots, or more; also OIL CARBON.
State Price, f.o.r. at nearest Station, to No. 3031, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. **Compare Prices and Particulars before ordering elsewhere.**
J. F. BLAKELEY, Gas Engineer, Ravensthorpe, YORKS.

YOUNG Man seeks Situation as Meter INSPECTOR or GAS-FITTER. Can fix Meters and Stoves, and used to Iron and Compo. work. Age 22.
Address W. K., care of Mr. H. Keirman, Manager, Gas-Works, Thorney, near PETERBOROUGH.

WANTED, by a young Man (married), a Situation as METER INSPECTOR or REPAIRER of Wet and Dry Meters. Could fill position of Collector. Excellent Testimonials from present and past Employers.
Address No. 3192, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a reliable Agent for a first-class DUTCH BOG ORE, containing 80-85 per cent. Hydrated Oxide of Iron.
Apply, by letter, to No. 3191, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at once, a Chemist at a Carbonizing Works. Must be thoroughly efficient, and have good knowledge of Tar Distilling.
Apply, by letter only, stating Age, Qualifications, and Salary required, to NEWTON, CHAMBERS, AND Co., LTD., Thorncliffe Collieries, SHEFFIELD.

LONGTON CORPORATION GAS DEPARTMENT.

WANTED, immediately, a thoroughly Practical WORKING FOREMAN, accustomed to Regenerator Settings, and used to handling Men. Wages £2 per week, with good House, Coal, and Gas.
Applications, enclosing not more than two Testimonials (*copies*), to be sent to the undersigned not later than Saturday, the 14th of January, 1899.
W. S. M'GREGOR, Assoc.M.Inst.C.E.
Gas Offices, Longton.

GWYNNE & BEALE'S
PATENT
GAS-EXHAUSTERS AND STEAM-ENGINES
FOR FULL PARTICULARS, APPLY TO THE MAKERS:
GWYNNE & CO.,
Telegrams: "GWYNNEGRAM, LONDON."
HYDRAULIC AND GAS ENGINEERS
Telephone No. 95 Holborn.
(Late Essex Street Works, Victoria Embankment, London),
BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

WANTED, two good Gas-Fitters. Well up in Combo, and Slot work.
Apply, stating Wages required, to Mr. R. BROWN, Gas Offices, CAMBRIDGE.

WANTED, a leading Draughtsman. Must be thoroughly conversant with Gas-Works Plant and Conveying Machinery.
State Age, Experience, and Wages required to the LEEDS FIRE-CLAY COMPANY, LIMITED, Engineering Department, Wortley, near LEEDS.

GAS-FITTER, Main and Service Layer wanted for Brecon, South Wales. Permanency. Must be steady and sober, and not under 30 Years of age.
Apply, with three References, and stating Wages required, to W. A. WRIGHT, Engineer, Gas Company, BRECON.

WANTED, for a small Gas-Works, a good STOKER, who understands Engine and Exhauster and Shovel Charging. Wages. 24s. per week during Summer Months and 26s. during Winter Months. None but steady Men need apply.
Apply to A. HOWARD, Manager, Gas-Works, Fazeley, near Tamworth, STAFFS.

WANTED, a Gas Stoker, used to Shovel Charging. One having had experience with Engine and Exhauster preferred. Permanency to a strictly sober and reliable man. Wages 26s. per week in Winter months, and 22s. per week during Summer months, with House, Gas, and Coal free.
Apply, by letter, with Reference, stating Age, &c., to No. 3193, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

LOUGHBOROUGH GAS COMPANY.

WANTED, immediately, a thoroughly practical WORKING FOREMAN, well up in Manufacture, Distribution, Repairs, &c. None but capable Men need apply. State Age and Experience, and forward not more than two Testimonials. Wages £2 per week, with very good House, Coal, and Gas free.
Apply to J. B. BALL, C.E., Manager, Gas-Works, LOUGHBOROUGH.

FOR SALE—A Gasholder and Cast-Iron TANK. The Tank is 41 feet in diameter and 15 feet deep. The Holder is 40 feet in diameter and 14 feet deep, with 9-inch Inlet and Outlet Pipes.
The above are in good condition, and are being removed for further Extensions.
WM. DUFF,
Secretary and Manager.
Gas-Works, Morecambe.

FOR SALE, Cheap, the under- mentioned—
Four Cast-Iron WATER-TANKS, 13 ft. diameter by 6 ft. 8 in. deep.
One Cast-Iron WATER-TANK, 16 ft. diameter by 13 ft. deep.
With Overflow Pipes and all Connections.
Apply to SAMUEL WHILE AND SON, 60, Queen Victoria Street, LONDON, E.C.

MONTROSE GAS COMPANY.

PURIFIERS FOR SALE.

FOR SALE—Four Purifiers, 8 ft. by 12 ft. by 3 ft. deep, all complete, Covers in good order, Sieves, Lifting Gear, &c. Six FOUR-WAY VALVES—viz., four 8-inch, and two (almost new) 10-inch. No reasonable offer refused. Valves alone worth £30.
T. D. HALL,
Manager.

TO RETORT & FIRE-BRICK MANUFACTURERS.

THE Corporation of Bury are prepared to receive TENDERS for RETORTS, FIRE-BRICKS, and FIRE-CLAY required at the Gas-Works.
Forms of Tender may be obtained from Mr. H. Simmonds, Gas Engineer, Gas-Works, Bury.
Tenders, sealed and endorsed "Tender for Retorts, &c.," to be sent to me not later than Monday, the 23rd day of January, 1899.
JOHN HASLAM,
Town Clerk.
Corporation Offices, Bank Street, Bury.

DEVONPORT WATER COMPANY,

FOURTH ISSUE OF £4 PER CENT. PREFERENCE STOCK, TO RAISE £10,000.

FIRST PAYMENT OF INTEREST WILL BE MADE ON THE 25TH OF MARCH NEXT.

The Company having for more than Ten Years past paid a Dividend of £5 per cent. on its Ordinary Stock, the Preference Stock now offered is, under the Trustees Investment Acts, an available Investment for Trustees who are not expressly forbidden from investing therein by the Instrument (if any) creating the Trust.

THE Directors of the Devonport Water Company are prepared to receive TENDERS for the sum of £10,000, or any part thereof, in Sums of £50 and upwards (being multiples of £10) free from all Charges and Expenses.
Tenders, stating the price per cent., which must not be below £125 per cent., should be sent, to the Secretary, on or before the 31st of January, 1899.
Forms of Tender may be obtained at the Naval Bank, Plymouth or Devonport, or any of its Branches; or from the Secretary of the Company.
The Security comprises the Income from Water-Rates and other Sources, which for the past Six Years have exceeded £12,000, and which are annually increasing.
The Stock to be issued will be entitled to a Preferential Dividend in Perpetuity over the Ordinary Stock.
For a Prospectus giving further Particulars and for Form of Tender apply to
FOSTER J. BONE,
Secretary.
23, Ker Street, Devonport,
December, 1898.

SHEFFIELD UNITED GASLIGHT COMPANY.

NEEPSEND STATION.

TO IRONFOUNDERS.

THE Directors of this Company invite TENDERS for the supply and erection (upon Foundations prepared by the Company) of Two CAST-IRON CONDENSERS, each consisting of 264 Pipes 9 inches diameter, with Arch Pipes, Bottom Boxes, Tar Boshes, &c. The Weight of the Two Sets will be about 160 Tons.
Drawings may be seen, and Specification with Bill of Quantities obtained, on application to the Engineer, Mr. Fletcher W. Stevenson.
Sealed Tenders, endorsed "Tender for Condensers," must be delivered by post not later than the first post on Saturday, the 28th day of January, 1899, to the undersigned at the Company's Offices.
The Directors do not bind themselves to accept the lowest or any Tender.
HANBURY THOMAS,
General Manager and Secretary.
Commercial Street, Sheffield,
Jan. 7, 1899.

WALLASEY URBAN DISTRICT COUNCIL.

GAS-WORKS EXTENSION.

TO MAKERS OF GAS PLANT.

THE Wallasey Urban District Council are prepared to receive TENDERS for the supply and erection of STATION GOVERNORS.
Copies of Specification and all Information may be obtained on application to the Engineer, Mr. J. H. Crowther, at his Office, at the Works, Great Float, near Birkenhead.
Sealed Tenders (on the form provided for the purpose), addressed to me, as under, and endorsed "Gas, &c., Committee; Tender for Station Governors," to be delivered, per post, not later than Four o'clock in the afternoon of Thursday, the 19th of January, 1899; and any Tenders arriving after that time will not be considered.
The Contractors will be required to enter into a Bond, with approved sureties, for the due performance of the Contract.
The Council do not bind themselves to accept the lowest or any Tender.
By order,
H. W. COOK,
Clerk to the Council.
Public Offices, Egremont,
Cheshire, Jan. 5, 1899.

ISLE OF THANET GASLIGHT AND COKE COMPANY.

PARTICULARS OF SALE BY TENDER OF £7000 3½ PER CENT. ORDINARY STOCK.

Being part of the Additional Capital authorized to be raised by resolution passed at Special Meeting of Proprietors, held on the 18th of November, 1898, in pursuance of the Powers of the Thanet Gas Act, 1898.

Subject to the Sliding Scale as explained below.

THE Directors are prepared to receive TENDERS for £7000 ORDINARY STOCK, such Stock to be paid up in full on or before the 1st of May, 1899, and to bear Dividend from that date.
A Deposit of 10 per cent. of the nominal amount of Stock tendered for must accompany each Tender, and half the amount of Premium offered; the balance to be paid three months after date of acceptance.
Any amount, being not less than £10, or a multiple thereof, may be tendered for; and the Stock will be registered in the Company's books, in the names of the Purchasers or their nominees, free of expense. No Stockholder can hold less than £20.
Where no allotment is made, the deposit will be returned; and in case of partial allotment, the balance of the deposit will be applied towards payment of the amount due on allotment.
The Stock will be alloted to the highest bidders.
The Dividends payable on the Stock now offered for Sale by Tender are regulated by the Sliding-Scale, as set forth in Section 11, the Thanet Gas Act, 1898:—

15. The Company may increase or reduce the price charged by them for Gas above or below the Standard price, subject to a reduction or increase in the Dividend payable by the Company on the Ordinary Capital or Stock as follows:—
20. In respect of any year during any part of which the prices charged by the Company shall have been one penny or part of a penny above the Standard Price, the dividend payable by the Company shall in respect of each penny or part of a penny by which the
25. Standard Price shall have been increased, be reduced below the Standard Rate of Dividend by Two Shillings and Sixpence on every One Hundred Pounds of Ordinary Share Capital, or Stock actually paid up, and so in proportion for any fraction of One Hundred Pounds. And
30. in respect of any year during the whole of which the price charged by the Company shall have been one penny or more below the Standard Price, the Dividend payable by the Company may in respect of each penny by which the Standard Price shall have been reduced be increased above the Standard Rate by Two Shillings and Sixpence on every One Hundred Pounds of Ordinary Share Capital or Stock actually paid up, and so in proportion for any fraction of One Hundred Pounds.

The initial Price of Gas is 4s. 2d. Present Price of Gas is 2s. 6d. per 1000 cubic feet. Last Dividend declared, 11 per cent. per annum.
The Dividends are paid on the 25th of March, for the Half Year ended the previous December, and the 29th of September for the June Half Year. The first Dividend on the new issue will be paid in September next.
Tenders must be sent to the Chairman on or before Jan. 31, 1899, after which date no Tender can be received.
Forms of Tender can be obtained on applying at the Offices, The Dane, Margate.
By order,
THOMAS C. FULLER,
Secretary.

SOUTH METROPOLITAN GAS COMPANY.

SALE BY TENDER OF £60,000 THREE PER CENT. PERPETUAL DEBENTURE STOCK.

MINIMUM PRICE, £101 per Cent.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER £60,000 OF THREE PER CENT. PERPETUAL DEBENTURE STOCK in accordance with the Provisions of the South Metropolitan Gas Acts, 1882 and 1896.
Particulars of same, with Form of Tender, can be obtained at this Office on application to the undersigned; and Tenders must be sent in on or before Tuesday, the 24th day of January, 1899.
The Stock will be allotted to the highest bidders; but no Tender will be accepted at a lower Price than at the rate of £101 money for each £100 Debenture Stock.
By order,
FRANK BUSH,
Secretary.
Offices: 709A, Old Kent Road, S.E.,
Dec. 31, 1898.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.
He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.
Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the Guildford Gaslight and Coke Company, the Directors of the Whitchurch and District (Hants) Gas Company, Limited, the Executors of the late G. E. Wood, Esq., and other Owners.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday, Jan. 17, at Two o'clock, in Lots—

GUILDFORD GASLIGHT AND COKE COMPANY (A new issue, by order of the Directors).—£5000 of ORDINARY STOCK, ranking for a Standard Dividend of 5 per cent., subject to the Sliding-Scale; the Dividend on similar Stock having been at this rate for several Years past.

WHITCHURCH AND DISTRICT (HANTS) GAS COMPANY, LIMITED (A new issue, by order of the Directors).—78 £10 ORDINARY SHARES.

WALTON-ON-THAMES AND WEYBRIDGE GAS COMPANY.—210 £10 "A" SHARES.

Also Stocks and Shares in the CHIGWELL, LOUGHTON, AND WOODFORD GAS COMPANY, the LEWES GAS COMPANY, the WEST HAM GAS COMPANY, and the WORTHING GAS COMPANY.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

Estate of the late G. Purdom, Esq.

GAS AND WATER STOCKS AND SHARES, IN THE

Commercial Gas Company, West Ham Gas Company, Tottenham and Edmonton Gaslight and Coke Company, Alliance and Dublin Consumers' Gas Company, Croydon Commercial Gas and Coke Company, Guildford Gaslight and Coke Company, Lowestoft Water and Gas Company, Upton-on-Severn Gas Company, Grays Gas Company, Limited, Worthing Gas Company, Waltham Abbey and Cheshunt Gas Company, Goring and Streatley District Gas and Water Company, Limited, Crays Gas Company, and the Ilminster Gas Company.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, the 31st of January, 1899, at Two o'clock precisely, in Lots.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

THE Acetylene Illuminating Company, Limited, 63, Queen Victoria Street, London, E.C., GIVE NOTICE that they hold the BRITISH PATENT RIGHTS for the MANUFACTURE OF CALCIUM CARBIDE by means of the electric furnace, that they are bringing an action against the Midland Acetylene (Parent) Syndicate, Limited, to restrain them from so manufacturing that product, and that they intend in the future to bring actions against all infringers of these Patents and all purchasers or users of Carbide of Calcium made in infringement of the same.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

Foolscap 4to, pp. 535, with 239 Illustrations and Steel Plate Engraving (as Frontispiece) of WILLIAM MURDOCH, *Inventor of Gas Lighting. Morocco Gilt, 21s.; Roan Gilt, 18s.*

THE SIXTH (AND CENTENARY) EDITION
OF THE

HANDBOOK
FOR
GAS ENGINEERS AND MANAGERS.

BY
THOMAS NEWBIGGING,
M.Inst.C.E.

This Edition of the "Handbook for Gas Engineers and Managers" is a great improvement on all previous editions. Much of the text has been re-written, in order to keep the work abreast of the constant advances that are being made in the Gas Industry. About fifty additional Illustrations are given; and a Steel-Plate Engraving of William Murdoch, the Inventor of Gas Lighting.

LONDON:
WALTER KING, 11, BOLT COURT,
FLEET STREET, E.C.

ENRICH YOUR GAS
WITH
CHEAP BENZOL.

AT to-day's Price of Benzol, Illuminating POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.

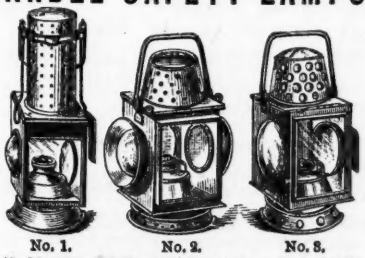
Apply to SADLER & CO., MIDDLESBROUGH.

DISPENSE WITH CANNEL COAL
and
INCREASE YOUR ILLUMINATING POWER
by using the
WHESSOE-MUNICH BENZOL CARBURETTER
The Cheapest and Best in the Market.
The Managers of Tynemouth, Middlesbrough, and Darlington Gas-Works are much pleased with it, and would not be without it.
Apply to the Sole Makers
THE WHESSOE FOUNDRY COMPANY, LIMITED,
DARLINGTON.

PRICE'S COKE & COAL BARROW

effects a great saving of time, labour, and expense.
For Particulars, Price, &c., apply to Mr. EDWARD PRICE, 119, Queen's Road, FINSBURY PARK, N.
Prices are Reduced.

ARMSTRONG'S PATENT
CANDLE SAFETY LAMPS.



No. 1. No. 2. No. 3.
43, MANCHESTER STREET, GRAY'S INN ROAD, W.C.

TUBES AND FITTINGS
ALL KINDS
WRITE FOR PRICES
STAFFORDSHIRE TUBE Co., BIRMINGHAM.

HEBBURN MAIN GAS COALS.
Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.
For Prices, f.o.b. Ship or Delivered by Rail, apply to
THE WALLSEND & HEBBURN COAL COMPANY, LTD.
3 Lombard Street, NEWCASTLE-ON-TYNE.
W. RICHARDSON, Fitter.

HEATHCOTE GAS COAL.
Rich in Illuminating Power and Yield of Gas. Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.
CHESTERFIELD.

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

HOLMSIDE
GAS COALS.
Present Daily Produce over 5000 Tons.
Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . . 11,205 Cubic Feet.
Illuminating Power $16\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality) $13\frac{3}{4}$ Cwt. per Ton.
Sulphur . . . . . A little over 1 per Cent.
Ash . . . . . Under 1 per Cent.
Tar . . . . . 163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor 103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR
PELTON GAS COALS.
Present Daily Produce available 3000 Tons.
Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.
Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.
These Coals may be bought through the Principal Merchants in England, or direct from
MR. MARK ARCHER,
HOLMSIDE & SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

LONDONDERRY GAS COALS
FROM THE
MARQUIS OF LONDONDERRY'S COLLIERIES,
COUNTY OF DURHAM.
Available Output up to 5000 Tons per day.
Yield of Gas 11,000 cubic feet per Ton of Coal as per Analysis by
Mr. John Pattinson, F.C.S., F.I.S.
FOR PRICES AND PARTICULARS, APPLY TO
S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM

THORNLEY GAS COALS
WORKED BY THE
WEARDALE IRON & COAL Co., Ld.
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by
Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton . .	10,500 Cub. Ft.
Illuminating Power . . .	16·9 Candles.
Coke (of good quality) . .	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

For Price, &c., apply to the
WEARDALE IRON & COAL Co., Ld.
QUAYSIDE, NEWCASTLE-ON-TYNE.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for
CANNEL & COAL.

TYNE
BOGHEAD CANNEL.

Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles
Coke per ton . . . . . 1,301·38 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 17·3 candles.
Coke . . . . . 70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 73·1 per cent.

For Prices and complete Analysis, apply to
THOS. W. DANCE & SONS,
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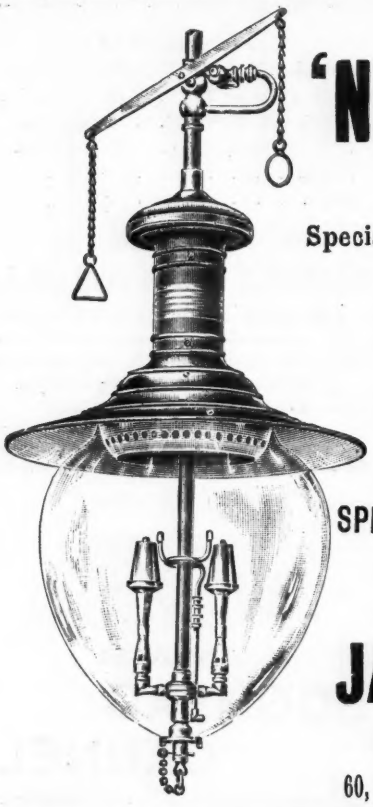

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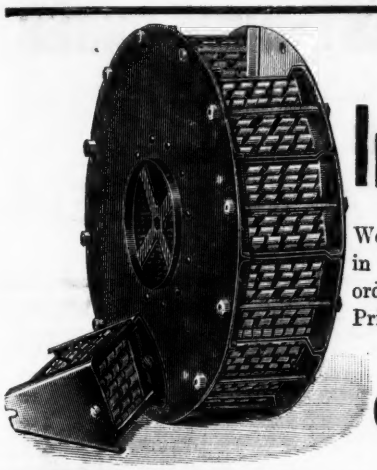

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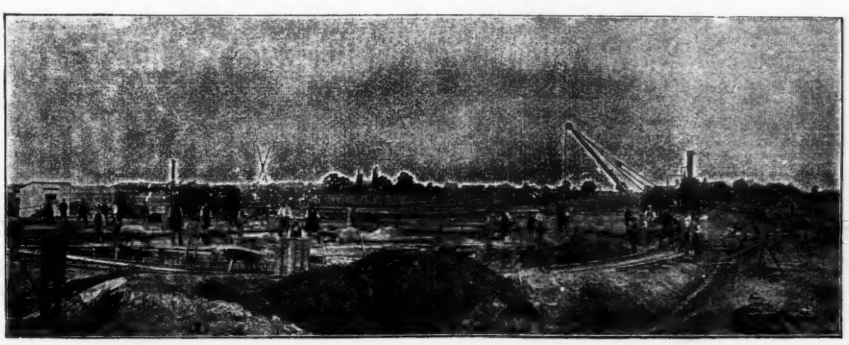

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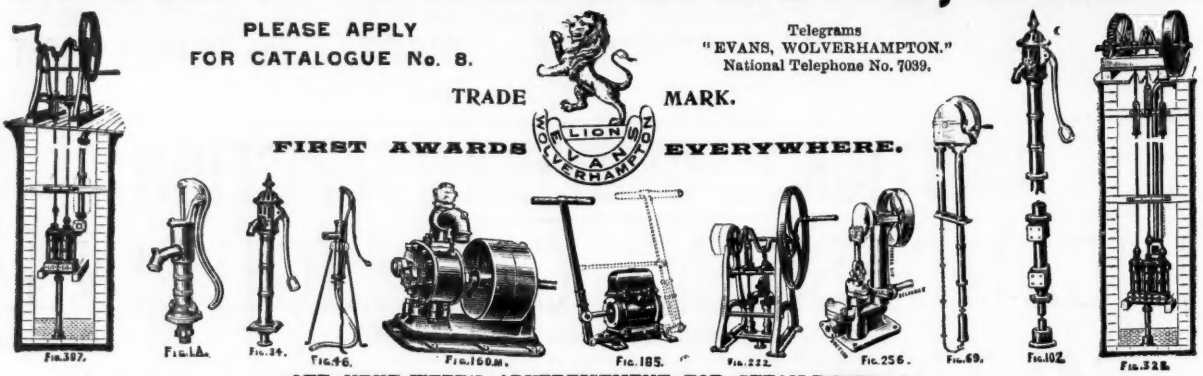

Fig.307. Fig.1A. Fig.34. Fig.46. Fig.160.M. Fig.185. Fig.222. Fig.256. Fig.69. Fig.102. Fig.328.

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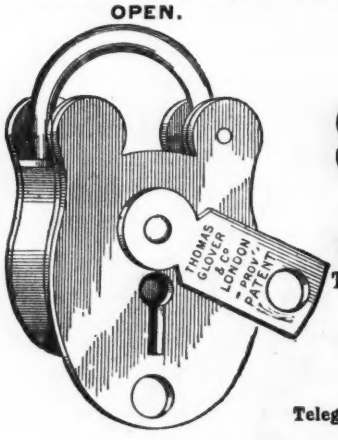

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Prevents Tampering with the

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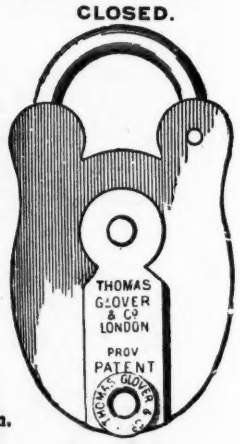

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Have confidence in drawing the special attention of **GAS ENGINEERS** to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
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[See Illustrated Advertisement, Jan. 3, p. 55.]

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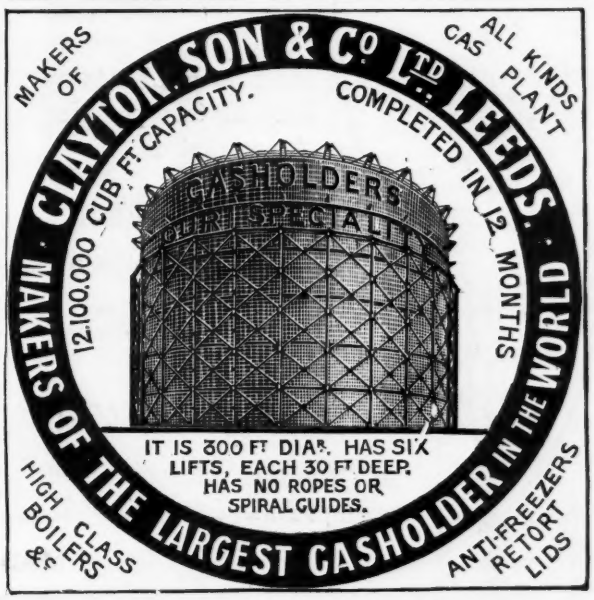
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CUBIC FEET OF GAS PER LINEAL FOOT OF RETORT (Ordinary Section) per 24 HOURS from ENGLISH COAL, and

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Together with every other possible Advantage.

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The Syndicate's Three-Light Cluster, governed to consume only 24 Cubic Feet of Gas per Hour, gives

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which speaks for itself.

The Syndicate works under the

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and Bandsept, who was the first to adopt the Injector Principle, is

STILL
AHEAD OF ALL RIVALS;

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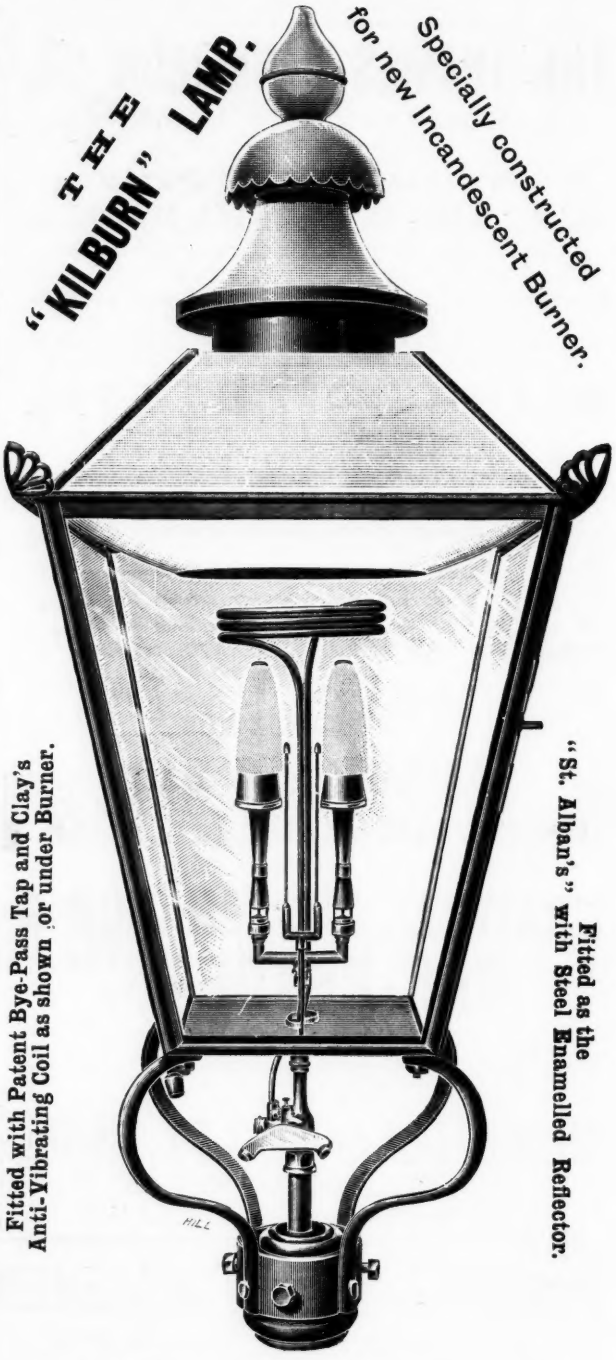
THE "KILBURN" LAMP.

Specially constructed for new Incandescent Burner.



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UNSURPASSED FOR QUALITY AND VALUE.

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MAKERS OF THE **BIRMINGHAM.**

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The ONLY GAS-PENDANT suitable for Domestic Lighting; a room 18 ft. by 14 ft. being beautifully illuminated with one Incandescent Burner.

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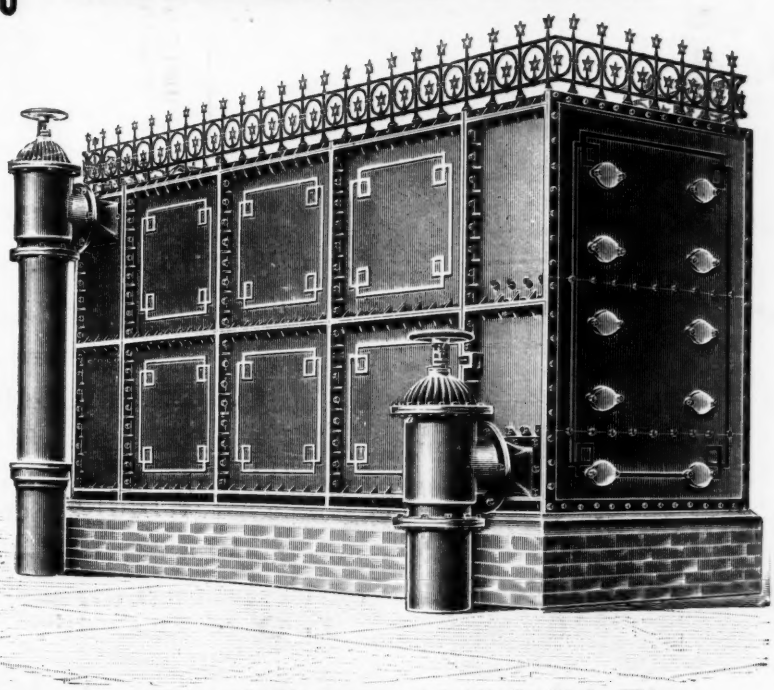
This water-cooled Gas Condenser is designed to work against the great variations of temperature between day and night, sunshine and shade, summer and winter, which are found in this and other countries.

Water being the cooling medium, the temperature of the gas can be kept under control better than with air; and the gas can be sent forward to the purifying plant at the proper temperature for efficient and economical purification.

The cold water enters at the bottom, and gradually rises to the top as the water absorbs heat, thus causing the warm gas to meet the warm water first, and to leave the Condenser in contact with water at any desired temperature by simply regulating the feed-water tap. The gas is thus **cooled progressively, uniformly, and effectually.** The simple construction of this Condenser affords a large cubical capacity, so that the gas remains in a considerable time, and secures all the advantage due to slow-speed condensation. Every part of the Condenser is easily accessible, and by removing the end plates the whole of the interior can be got at. It can be erected under cover, and protected from extremes of heat or cold.

R. & J. DEMPSTER, LTD., recommend this Condenser to be used as a Finishing Condenser, after the gas has already passed through the ordinary Annular or Air Condensers.

Condensers of this type equal to 10,500,000 cubic feet per 24 hours already erected and at work.



From a Photograph of Condenser erected at the Gas-Works, Widnes. Capacity 1,500,000 cubic feet per 24 hours.

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[See also Advt. p. 72.

LONDON: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, Jan. 10, 1899.